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Information in Organizations as Signal and Symbol

Martha S. Feldman and
James G. March

Formal theories of rational choice suggest that information about the possible consequences of alternative actions will be sought and used only if the precision, relevance, and reliability of the information are compatible with its cost. Empirical studies of information in organizations portray a pattern that is hard to rationalize in such terms. In particular, organizations systematically gather more information than they use, yet continue to ask for more. We suggest that this behavior is a consequence of some ways in which organizational settings for information use differ from those anticipated in a simple decision-theory vision. In particular, the use of information is embedded in social norms that make it highly symbolic. Some of the implications of such a pattern of information use are discussed.•

INTRODUCTION

Organizations are consumers, managers, and purveyors of information. Rules for gathering, storing, communicating, and using information are essential elements of organizational operating procedures. The technologies associated with using and managing information are the bases for several major growth industries, most notably computing and consulting. Reputations for organizational intelligence are built on capabilities for securing, analyzing, and retrieving information in a timely and intelligent manner. This practical consciousness of the importance of information is mirrored by research intended to understand and improve the uses of information by human beings. Information-processing interpretations of cognition, economic theories of information, and cybernetic perspectives on adaptation all build on the idea that the processing of information is a vital aspect of human behavior.

The study of information in organizations, like the study of choice with which it is often closely allied, involves a dialectic between students of information behavior on one hand and information engineers (or economists) on the other. Information engineers hope to design information systems with some clear elements of sensibility in them, or, in the best of all worlds, to design optimal systems (Kanter, 1972; Keen, 1977; Henderson and Nutt, 1978). For students of behavior, the problem is to understand actual human encounters with information. They focus on such things as the ways in which individuals and organizations deal with information on environmental uncertainty and risk (Tversky and Kahneman, 1974; Janis and Mann, 1977; Slovic, Fischhoff, and Lichtenstein, 1977; Nisbett and Ross, 1980), the ways in which individuals and organizations initiate and discontinue search activities (March and Simon, 1958; Cyert and March, 1963; Staw and Szwajkowski, 1975; Sabatier, 1978), and the ways in which organizational biases are reflected in information processing (Cyert, March, and Starbuck, 1961; Wilensky, 1967; Allen, 1969; Adelman, Stewart, and Hammond, 1975).

The dialogue between information engineers and students of information processing is most direct when differences between actual human behavior and apparently optimal information behavior are observed. Engineers characteristically seek to improve behavior, to instruct human actors in techniques for making better use of information. Students of information

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behavior characteristically suspect that some strange human behavior may contain a coding of intelligence that is not adequately reflected in engineering models. This paper follows the latter tradition. It recounts some familiar observations about information in organizations that are difficult to make consistent with simple notions of the value of information in making decisions; and it attempts to identify ways in which the behavior might make sense if placed in a somewhat broader frame.

INFORMATION AND ORGANIZATIONAL CHOICE

The classic representation of organizational choice is a simple extension of decision-theory visions of individual choice. In particular, decisions are seen as derived from an estimate of uncertain consequences of possible actions and an estimate of uncertain future preferences for those consequences (Luce and Raiffa, 1957; Taylor, 1975). Both estimates are problematic. They depend on information that is imperfect in a number of obvious ways. Organizations make explicit and implicit decisions about seeking and using information that might improve estimates of future consequences and future preferences. These decisions are, of course, also presumed to be based on estimates of the expected benefits and costs of particular information, information strategies, or information structures.

Within this basic framework, search behavior, investments in information, and the management of information are driven by the desire to improve decisions. The value of information depends in a well-defined way on the information's relevance to the decision to be made, and on its precision, cost, and reliability. Information has value if it can be expected to affect choice. It is a good investment if its marginal expected return in improving decisions exceeds its marginal cost. The calculation of information value in a particular case is likely to be quite difficult. The framework, however, is simple and the idea is appealing (Raiffa, 1968; Marschak and Radner, 1972). This perspective on decision making leads to some simple expectations for information utilization. For example, relevant information will be gathered and analyzed prior to decision making; information gathered for use in a decision will be used in making that decision; available information will be examined before more information is requested or gathered; needs for information will be determined prior to requesting information; information that is irrelevant to a decision will not be gathered.

Studies of the uses of information in organizations, however, reveal a somewhat different picture. Organizations seem to deal with information in a different way from that anticipated from a simple reading of decision theory. The following three stories of decision making in organizations illustrate the contrasts. These stories provide a contextual description of the relation between information and decision making. The three episodes are not exceptional. They are taken from studies by Merewitz and Sosnick (1971), Bower (1970), and Hägg (1977). Others could easily have been used. They include examples taken from private and public, profit and non-profit, American and foreign, and large and small organizations. None of the studies was primarily concerned with the information focus of the present paper. Rather, each study portrays a typical, minor example of the process of problem solving and decision making in an undramatic situation. The descriptions here are brief and incomplete, but we have tried to retain the flavor of the use of information reported in the original studies.

Illustration Number 1: Supersonic Transport

Consider decision making within the American national government regarding governmental support for the development of a commercial supersonic aircraft (Merewitz and Sosnick, 1971). In 1961, Congress appropriated funds for exploratory research on supersonic transports. Earlier studies had been commissioned by both the air force and the Federal Aviation Agency. These studies indicated that aircraft manufacturers were unlikely to undertake construction of a supersonic aircraft without government support. The FAA feasibility study commissioned in 1960 was available in 1963. It found "no economic justification for the SST" (Merewitz and Sosnick, 1971: 252). In 1963, after Pan American Airways took options on six Concordes (the British-French SST), President Kennedy committed the United States to developing a supersonic transport in partnership with private industry. By 1966, construction of a prototype was underway. In 1967, the FAA found the supersonic transport to be "viable as a public investment" (Merewitz and Sosnick, 1971: 254). The same year, Congress voted to continue prototype construction. In 1970, Congress rejected a $290 million appropriation for the project, finally approving (in 1971) only $85 million. This meant an end to the development, at least for the near future.

Illustration Number 2: A New Manufacturing Facility

Consider this standard example of corporate planning and capital investment (Bower, 1970). The case involved a project that originally developed as a sideline at one plant of a manufacturing company. As the project expanded, it outgrew existing facilities and proposals were made either to expand the plant or to build a new facility for the project. Between February 1966 and April 1967, repeated analyses and forecasts about the project were made. In April 1966, the project was losing more than had been forecast. The loss was attributed to low sales and high development costs. By October 1966 the project was showing increasingly poor operating results, lower than predicted by the forecasts. This was interpreted as having been caused by marketing problems; no change in the project was considered. Initial proposals to modify an existing plant by building a new warehouse were expanded to include building a whole new facility as well. As the plans for capital investment went forward, estimates of the projected performance were adjusted downward several times to make the proposal more believable.

Illustration Number 3: New Equipment

Consider the post hoc review of a project involving buying and installing packaging equipment in the manufacturing department of a Swedish firm (Hägg, 1977). The project was seen as a way to reduce personnel and thereby avoid production delays attributable to absenteeism. The investment proposal was submitted and approved in September 1973. By mid-1974, the equipment had been bought and installed and was in operation. In December 1974, a review report was written. The review showed that the project had, in fact, reduced the number of personnel by two. However, it also showed that the resetting times had been longer than expected and that installation problems had delayed the achievement of normal working conditions beyond the projected date. These problems produced the types of delays that the reduction in the number of personnel was supposed to eliminate. No action was taken as a result of the review. Installation problems were attributed to "the supplier who had given wrong information and who had not supplied the needed expert service" (Hägg, 1977: 81), and the longer resetting times were seen as a result of inadequately trained mechanics. The review was seen as a good idea, nevertheless.

These case studies show a relation between information and decision making that is rather distant from the one anticipated by classical conceptions drawn from decision theory. Considerable information was gathered by the organizations involved in the decisions. Considerable information was sometimes volunteered by other organizations. There was little systematic relation between the time of receiving the results of a study and the time of making a decision. There was no obvious consistent relation between the findings of studies and the decision made. Information was gathered. More information was sought. Information was considered. But the link between decisions and information was weak.

Similar stories are told repeatedly in the research literature. Their number could be increased almost at will.[1] The literature reports phenomena that can be summarized by six observations about the gathering and use of information in organizations. The observations are consistent with the research literature yet close enough to personal experience to be almost self-evident: (1) Much of the information that is gathered and communicated by individuals and organizations has little decision relevance. (2) Much of the information that is used to justify a decision is collected and interpreted after the decision has been made, or substantially made. (3) Much of the information gathered in response to requests for information is not considered in the making of decisions for which it was requested. (4) Regardless of the information available at the time a decision is first considered, more information is requested. (5) Complaints that an organization does not have enough information to make a decision occur while available information is ignored. (6) The relevance of the information provided in the decision-making process to the decision being made is less conspicuous than is the insistence on information. In short, most organizations and individuals often collect more information than they use or can reasonably expect to use in the making of decisions. At the same time, they appear to be constantly needing or requesting more information, or complaining about inadequacies in information.

It is possible, on considering these phenomena, to conclude that organizations are systematically stupid. There is no question that organizational processes are sometimes misguided and that organizational procedures are sometimes incomprehensibly inattentive to relevant information. Nevertheless, it is possible to try to discover why reasonably successful and reasonably adaptive organizations might exhibit the kinds of information behaviors that have been reported. Perhaps the stories of information perversity tell us less about the weak-

[1] For example, Lindblom (1959); Wohlstetter (1962, 1965); Cyert and March (1963); Wilensky (1967); Olsen (1970); Allison (1971); Beneviste (1972); Cohen and March (1974); Eliasson (1974); Halperin (1974); Lucas and Dawson (1974); Steinbruner (1974); Lynch (1975); Craham (1976); Kreiner (1976); March and Olsen (1976); Meltsner (1976); Tietenberg and Toureille (1976); Weiss (1977); Estler (1978); Sabatier (1978); Sproull, Weiner, and Wolf (1978); Clark and Shrode (1979); Krieger (1979).

nesses of organizations than about the limitations of our ideas about information.

INFORMATION INCENTIVES, GOSSIP, AND MISREPRESENTATION

There are several elementary instrumental reasons why information use in organizations deviates from a standard decision-theory vision. At the outset two relatively conventional explanations should be noted First, organizations may be unable, because of organizational or human limitations, to process the information they have. They experience an information glut as a shortage. Indeed, it is possible that the overload contributes to the breakdown in processing capabilities (Wohlstetter, 1962; Miller, 1977). The second explanation is that the information available to organizations is systematically the wrong kind of information. Limitations of analytical skill or coordination lead decision makers to collect information that cannot be used. Thus, although there is a great deal of information, there is not enough relevant information (Janis and Mann, 1977). These interpretations certainly have bases in what we know about the uses of information in organizations, but they seem to be limited by their implicit acceptance of the standard formulation of the decision problem in an organization.

There are three other conspicuous features affecting the instrumental use of information in organizations. First, ordinary organizational procedures provide positive incentives for underestimating the costs of information relative to its benefits. Second, much of the information in an organization is gathered in a surveillance mode rather than in a decision mode. Third, much of the information used in organizational life is subject to strategic misrepresentation.

Information Incentives

Organizations provide incentives for gathering more information than is optimal from a strict decision perspective (Bobrow, 1973; Hundel, 1977; Chan, 1979). Consider, for example, two simple speculations about systematic bias in estimating the benefits and costs of information. First, the costs and benefits of information are not all incurred at the same place in the organization. Decisions about information are often made in parts of the organization that can transfer the costs to other parts of the organization while retaining the benefits. Suppose having too much information (i.e., having an information overload) increases the risk of being unable either to comprehend the information or to use it effectively in a decision. Since the information-gathering functions are typically separated from the information-using functions of organizations, incentives are modest for gatherers to avoid overloading users. The user of information invites a bias by accepting responsibility for the utilization of information while delegating responsibility for its availability.

Second, post hoc accountability is often required of both individual decision makers and organizations. An intelligent decision maker knows that a decision made in the face of uncertainty will almost always be different from the choice that would have been made if the future had been precisely and accurately predicted. As a consequence, a decision maker must anticipate two post hoc criticisms of information-gathering behavior: (1) that the likelihoods of events that in fact subsequently occurred were, on the average, underestimated, and thus that less information about these events was secured than should have been; and (2) that the likelihoods of events that in fact subsequently did not occur were, on average, overestimated, and thus that *more* information about them was secured than should have been. If, as seems very likely, the first criticism is more likely to be voiced than the second, it is better from the decision maker's point of view to have information that is not needed than not to have information that might be needed. The asymmetry in post hoc assessment leads directly to an incentive for gathering too much information.

Information as Surveillance

Organizations, as well as individuals, collect gossip (Aguilar, 1967; Mintzberg, 1972). They gather information that has no apparent immediate decision consequences. As a result, the information seems substantially worthless within a decision-theory perspective. The perspective is misleading. Instead of seeing an organization as seeking information in order to choose among given alternatives in terms of prior preferences, we can see an organization as monitoring its environment for surprises (or for reassurances that there are none). The surprises may be new alternatives, new possible preferences, or new significant changes in the world. The processes are more inductive than deductive. The analysis is more exploratory data analysis than estimation of unknown parameters or hypothesis testing.

The surveillance metaphor suggests either a prior calculation of needed information or a kind of thermostatic linkage between observations and actions. In this metaphor, systems for surveillance are justified in terms of the expected decisions and environments to be faced. Systems for surveillance are connected to decision rules in such a way that the relatively long lead times required for information gathering can be linked to relatively short decision times. This vision, however, can easily become overly heroic if it presumes explicit calculations by the organization. Such calculations are made in organizations, but they do not seem to account for much of what we observe. Organizations gather gossip — news that might contain something relevant but usually does not — in situations in which relevance cannot be specified precisely in advance.

Strategic Information

Many studies of human information processing involve situations in which experimental subjects are asked to respond to information known by the experimenter to be reasonable, neutral information. Very few situations in the real world of organizations are of that sort. Most information that is generated and processed in an organization is subject to misrepresentation. Information is gathered and communicated in a context of conflict of interest and with consciousness of potential decision consequences. Often information is produced in order to persuade someone to do something. It is obvious that information can be an instrument of power, and substantial recent efforts to refine the economics of information and the economics of agency focus on managing the problems of strategic unreliability in information (Crozier, 1964; Rothschild and Stiglitz, 1976; Hirschleifer and Riley, 1979).

When strategic misrepresentation is common, the value of information to a decision maker is compromised. Strategic misrepresentation also stimulates the oversupply of information. Competition among contending liars turns persuasion into a contest in (mostly unreliable) information. If most received information is confounded by unknown misrepresentations reflecting a complicated game played under conditions of conflicting interests, a decision maker would be curiously unwise to consider information as though it were innocent. The modest analyses of simplified versions of this problem suggest the difficulty of devising incentive schemes that yield unambiguously usable information (Mirrlees, 1976; Demski and Feltham, 1978). Yet organizations somehow survive and even succeed. Individuals develop rules for dealing with information under conditions of conflict. Decision makers discount much of the information that is generated. Not all information is ignored, however, and inferences are made. Decision makers learn not to trust overly clever people, and smart people learn not to be overly clever (March, 1979).

The significant organizational incentives for gathering information, the gathering of information in a surveillance mode rather than a decision mode, and the strategic misrepresentation of information in organizations all contribute to the information phenomena that have been noted in organizations and provide reasons for decoupling information from decisions. Rational, sensible individuals in organizations, pursuing intelligent behavior, will often gather more information than would be expected in the absence of such considerations and will attend to information less. Such instrumental complications affecting information behavior in organizations are, however, not the only explanations for the anomalies we observe. In fact, they are probably less important than a more profound linkage between decision behavior and the normative context within which it occurs. Information is a symbol and a signal.

INFORMATION AS SYMBOL AND SIGNAL

Information as Symbol

Organizational decisions allocate scarce resources and are thereby of considerable social and individual importance. But decision making in organizations is more important than the outcomes it produces. It is an arena for exercising social values, for displaying authority, and for exhibiting proper behavior and attitudes with respect to a central ideological construct of modern western civilization: the concept of intelligent choice.[2] Bureaucratic organizations are edifices built on ideas of rationality. The cornerstones of rationality are values regarding decision making (Weber, 1947). There are no values closer to the core of western ideology than these ideas of intelligent choice, and there is no institution more prototypically committed to the systematic application of information to decisions than the modern bureaucratic organization.

The gathering of information provides a ritualistic assurance that appropriate attitudes about decision making exist. Within such a scenario of performance, information is not simply a basis for action. It is a representation of competence and a reaffirmation of social virtue. Command of information and information sources enhances perceived competence and inspires confidence. The belief that more information characterizes better decisions engenders a belief that having information, in itself, is good and that a person or organization with more information is better than a person or organization with less. Thus the gathering and use of information in an organization is part of the performance of a decision maker or an organization trying to make decisions intelligently in a situation in which the verification of intelligence is heavily procedural and normative. A good decision maker is one who makes decisions in the way a good decision maker does, and decision makers and organizations establish their legitimacy by their use of information.

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[2] For more general discussion of the role of symbols in decision making, see Edelman (1964, 1977); March and Olsen (1976); Pfeffer (1980).

Observable features of information use become particularly important in this scenario. When there is no reliable alternative for assessing a decision maker's knowledge, visible aspects of information gathering and storage are used as implicit measures of the quality and quantity of information possessed and used. For example, being the first to have information and having more and different information indicate the proximity of an individual or organization to important information sources. Similarly, the resources expended on gathering, processing, and displaying information indicate the quantity and quality of information an individual or organization is likely to have. Displaying information and being able to explain decisions or ideas in terms of information indicate an ability to use information easily and appropriately.

These symbols of competence are simultaneously symbols of social efficacy, and they secure part of their justification there. Belief in the appropriateness of decisions, the process by which they are made, and the roles played by the various actors involved is a key part of a social structure. It is important not only to decision makers that they be viewed as legitimate; it is also vital to society. Ritual acknowledgement of important values celebrates a shared interpretation of reality (Berger and Luckman, 1966). Thus, requesting information and assembling it are ways of making social life meaningful and acceptable.

Standard decision-theory views of choice seem to underestimate these symbolic importances of information and the use of information in decision making. Because the acts of seeking and using information in decisions have important symbolic value to the actors and to the society, individuals and organizations will consistently gather more information than can be justified in conventional decision theory terms. Decisions are orchestrated so as to ensure that decision makers and observers come to believe that the decisions are reasonable — or even intelligent. Using information, asking for information, and justifying decisions in terms of information have all come to be significant ways in which we symbolize that the process is legitimate, that we are good decision makers, and that our organizations are well managed.

Information as Signal

When legitimacy is a necessary property of effective decisions, conspicuous consumption of information is a sensible strategy for decision makers. The strategy need not be chosen deliberately. It will accompany processes that work. Decisions that are viewed as legitimate will tend to be information-intensive. Decision makers who are persuasive in securing acceptance of decisions will request information, gather information, and cite information. The behavior is a representation of appropriate decision making.

From this point of view, we can examine information gathering and requesting as the kind of signal familiar to the economics of information (Spence, 1974; Nelson, 1974; Meyer, 1979). It is possible that the signal is a valid one. This would be true if organizations that generally produce better decisions are also able to gather and exhibit information at lower cost than those who produce poorer decisions. Even if information contributes nothing directly to the quality of decisions, better decision makers would invest more in information, and decision-maker quality could be estimated accurately by monitoring information practice.

A strategy of legitimation through the use of information cannot, however, be chosen at will. The arbitrary symbolic use of information is subject to limits imposed by competition for legitimacy and variations in the costs of exhibiting information consumption. Since organizations compete for legitimacy, no single organization can control its own relative reputation by its own actions, and the comparative positions of different organizations depend critically on differences in the costs to organizations of maintaining an information posture.

The price of securing information is the value of foregone opportunities. The cost calculation depends not only on the usual considerations of efficiency but also on the kinds of alternative investments that are available. If, for example, the quality of decisions is automatically reflected in costless performance measures, the net returns from further signaling would be negatively correlated with decision quality. As a result, the signal would not be a valid one. By this analysis, information use is more likely to be a valid signal when performance criteria are obscure than when they are clear. Indeed, when the intrinsic quality of decisions is exceptionally difficult to assess, the signaling process may itself affect quality. Suppose, for example, that belief in the legitimacy of a decision is encouraged by the conspicuous utilization of information, and that the legitimacy of a decision, in turn, affects its implementation (an element of quality). Then those organizations that have relatively low signaling costs (or that for other reasons invest in information) will ultimately become better decision makers. The signal will, by this mechanism, become a valid one.

When benefits from information use are approximately equal among organizations, and costs of maintaining an information system are less for good decision makers than for others, conspicuous consumption of information is neither organizationally nor socially foolish. The behavior is an effective signal. It is, of course, possible that an alternative signaling system might be devised that would be less costly for organizations and for society and would still provide equally reliable information. In particular, a system that dampened the competition for legitimacy homogeneously across organizations might be preferred. But the signal that exists appears to have some of the properties associated with signaling validity and cannot be casually discarded.

The information economics perspective is instructive, particularly in its focus on conditions for signal validity and stability in a signaling system. But that perspective is not essential to an appreciation of the symbolic significance of information posturing. Reason, rationality, and intelligence are central values in modern industrial societies. Within such societies, life is choice; choice is appropriately informed when the best available information about possible future consequences of present actions is sought. In a society committed to intelligent choice, requests for information and the gathering of information will generally be rewarded by observers; less systematic procedures are common, but they tend to be less reliably rewarded. Whether we think of simple learning, of some ideas about role-taking, or of socialization into basic values, we develop a similar conclusion. The pattern of information gathering and utilization that characterizes such a society must be as much a part of ordinary experience as the most elementary social values of honesty, autonomy, and self-reliance.

THE DYNAMICS OF SYMBOLS

This paper has presented some possible reasons for certain apparently peculiar information behavior in organizations. The reasons suggested above emphasize the strategic and symbolic incentives for gathering information. Such reasons are, however, only an introduction to understanding the process. In particular, there is no reason to assume that organizational behavior with respect to information is stable, that the process is in equilibrium. Consider, for example, the classic dynamics of symbolic life: I learn French to symbolize my commitment to a cultured life, but having learned French I discover ways in which it is useful; I buy a car to symbolize my affluence, but having the car leads me to discover the pleasures of automobile travel; I work for a political candidate to symbolize civic duty and solidarity, but in the process I discover opportunities for political power. When organizations establish information systems, however symbolic or strategic the initial reasons may be, they create a dynamic that reveals new justifications as the organizational process unfolds.

The analytical problem is similar to the problem of understanding hypocrisy in individual behavior. The hypocrite presumably adopts the assertion of a value as a symbolic substitute for action. In the short run, hypocrisy is both a social acknowledgement of the importance of a value and an evasion of the value. In the long run, however, proclamation of social values, particularly when associated with opportunities for social approbation, changes the action. The changes are not necessarily intentional. It is not easy to be a stable hypocrite. Similarly, it is hard to find stable symbols or tactics in organizations. Each creates a dynamic by which it is transformed.

At the individual level, symbols produce belief and belief stimulates the discovery of new realities. For example, suppose that individuals in organizations are inclined to attribute successes, but not failures, to factors they control (Davis and Davis, 1972; Miller and Ross, 1975) and suppose that information-gathering decisions are something that successful decision makers feel they control. Then successful decision makers would come to believe that the information rituals they control are, in fact, important to decision making. If they then act to make information important to decision making, and discover new ways of making these tools indispensible, the circle is complete. Tactical uses of information are transformed into belief, and thence into functional necessity.

The process at the organizational level is similar, though the mechanisms are slightly different. An example is the creation of a special office symbolizing a newly important value (e.g., environmental protection, affirmative action). The office may have been established as a symbolic alternative to more substantial action (Edelman, 1964, 1977). New offices, however, are not passive. They affect their own functions. Consider the dynamics of flak-catching (Wolfe, 1970). Organizations create flak-catching offices — special offices to display their concern for outside complaints, pressures, and the like. But flak-catchers, who are commissioned to protect an organization from flak and to symbolize a commitment to deal appropriately with flak quickly learn to enhance the importance of flak. The mechanisms are familiar. Partly, flak-catchers are chosen because of some willingness to deal with outsiders, perhaps because of prior affinity to them. Partly, they learn from their association with outsiders to identify with them. Partly, they discover that their importance in the organizations depends on the existence of flak (Taylor, 1980).

These dynamics apply to almost any specialized function in an organization. Individuals and organizations gathering, storing, and analyzing information are likely to behave in this way. Organizational departments assigned information-processing responsibilities are unlikely to remain neutral with respect to the uses of information. Partly, people who gather and use information will tend to be people who believe that information gathering is important. Individuals who discover they are good at solving problems using information will discover more ways for making it sensible to do so. Partly, people who gather and use information will associate with other information gatherers and users and will come to identify with them. As a class, they will generate belief in their importance. Partly, people who gather and use information will try to convince others of its importance as a natural way of ensuring their own importance. People who prepare reports are likely to try to persuade others to read them. Individuals who use information because it serves a particular purpose are likely to come to believe information is useful in a more general way. Individuals who request information are likely occasionally to find it useful, even to come to believe in the general utility of information gathering.

Although it is easy to observe that arbitrary actions induce instrumental interpretations and become effective practical instruments under fairly general conditions, it is clear that the process does not always proceed rapidly and rarely goes to the limit. Exploring such dynamics significantly is beyond the scope of the present paper. These dynamics are, however, important to its spirit. We have tried to describe some ways in which apparently anomalous behavior is sensible and have explored particularly the symbolic significance of information use. In the process, we have suggested that simple decision-theory visions of information and its value do not match the ways in which information is used in organizations as we observe them. The argument has been made in a form that might suggest a stable separation of symbolic and instrumental action. But organizations as we observe them are not stable. They change, and they change in a way that weaves the symbolic and instrumental aspects of life together, not in the sense that everything is both (though that is true enough) but in the sense that interpretations of life affect life. If there is substantial decision value in information, the present pattern of investment in information may be a good strategy for discovering that value. Symbolic investments in information are likely to convert to more instrumental investments.

A strategy of using symbolic investments in information as an instrument of change is dependent on a corresponding ideology. The symbolic value of information is a function of the social norms of a society and of a belief in rational decision processes of a particular kind. It is not hard to imagine a society in which requests for information, and insistence on reports and analyses, would be signs of indecisiveness or lack of faith. Even within the rational traditions of the enlightenment, decision-theory perspectives on intelligence have competitors. Suppose that interpretations of decision making that emphasize loose coupling rather than organizational structure, ambiguity rather than precision, and limited rather than complete rationality succeed in changing the normal conception of organizational life. Then the symbolic value of information will be compromised. Organizations will be less inclined to treat information gathering as a precious manifestation of their virtue. Information will be a less effective signal of their competence.

CONCLUSION

From a classical decision-theory point of view, information is gathered and used because it helps make a choice. Investments in information are made up to the point at which marginal expected cost equals marginal expected return. Observations of organizations are not easy to reconcile with such a picture. Individuals and organizations invest in information and information systems, but their investments do not seem to make decision-theory sense. Organizational participants seem to find value in information that has no great decision relevance. They gather information and do not use it. They ask for reports and do not read them. They act first and receive requested information later.

It is possible, on considering these phenomena, to conclude that organizations and the people in them lack intelligence. We prefer to be somewhat more cautious. We have argued that the information behavior observed in organizations is not, in general, perverse. We have suggested four broad explanations for the conspicuous over-consumption of information. First, organizations provide incentives for gathering extra information. These incentives are buried in conventional rules for organizing (e.g., the division of labor between information gathering and information using) and for evaluating decisions. Second, much of the information in organizations is gathered and treated in a surveillance mode rather than a decision mode. Organizations scan the environment for surprises as much as they try to clarify uncertainties. Third, much of the information in organizations is subject to strategic misrepresentation. It is collected and used in a context that makes the innocence of information problematic. Fourth, information use symbolizes a commitment to rational choice. Displaying the symbol reaffirms the importance of this social value and signals personal and organizational competence.

These factors seem important enough to affect organizational information behavior significantly. They can influence organizational behavior through any of the usual mechanisms of adaptation. To some extent, individuals and organizations calculate the alternatives and decide to buy information (or use information). Such conscious decisions, if taken sensibly with knowledge of the factors we have discussed, will lead to an information strategy that is more like what is observed than what is expected from a simple model of information investment. Even without conscious calculation, organizations will learn from experience to follow strategies that generate information without using it. Strategies developed from calculation or learning could spread through a population of organizations by imitation. Alternatively, some process of natural selection among procedural rules can be seen as selecting rules that encourage considerable investment in information. In such cases, the intelligence of the behavior is buried in the rules and is not easily retrieved (or expressed) by individuals within the organization. Learning, imitation, and selection tend to hide the intelligence of behavior within rules and rule-following. Understanding fully the ways in which particular kinds of experience are coded into particular kinds of rules requires a precise specification of the adaptive mechanisms. For present purposes, however, all that is needed is to note that the factors identified here need not necessarily affect behavior by inducing incentives, conscious calculation, and intentionally strategic action. The mechanisms may be considerably more indirect than that yet retain the same essential effect.

These general ideas have some obvious research implications. The factors we have identified are not homogeneously relevant across organizations, decision situations, and time. We should observe some systematic variation in the information behavior of organizations and the individuals in them. That is not to say that the phenomena are limited to a small number of organizations. On the contrary, they are very general. Nevertheless, we might expect investment in information to be particularly sensitive to variations in the symbolic requirements and signaling opportunities of the organization.

The kinds of information behavior noted here should be more common in situations in which decision criteria are ambiguous than in situations in which they are clear, more common where performance measures are vague than where they are precise, more common when decision quality requires a long period to establish than when there is quick feedback, more common where the success of a decision depends on other decisions that cannot be predicted or controlled than where a decision can be evaluated autonomously, more common where other legitimating myths (e.g., tradition or faith) are not important than where they are, more common in institutions and occasions closely linked to rational ideologies than in those that are distant from such ideologies. Thus, we might reasonably predict that the phenomena are more conspicuous in policy making than in engineering, more conspicuous in the public sector than in the private, more conspicuous at the top of an organization than at the bottom, more conspicuous in business than in the church or family, more conspicuous in universities than in football teams. To list such speculations is not to claim their correctness. Indeed, casual evidence seems unsupportive of one or two of them. Nor is the present essay a good occasion for attempting to assess the ideas empirically. Such pleasures are left, in the grand tradition of such things, to the reader.

A static analysis of information use, however, is likely to be misleading. The symbolic significance of any activity depends on the social norms within which it is undertaken. Information is significant symbolically because of a particular set of beliefs in a particular set of cultures. These beliefs include broad commitments to reason and to rational discourse, as well as to the modern variants that are more specifically linked to decision-theory perspectives on the nature of life. As social norms change, the relevance of information as a symbol, or signal, changes with them. At the same time, symbolic actions reveal more instrumental consequences. Like other behavior, symbolic behavior explores possible alternative interpretations of itself and creates its own necessity. Thus, it is possible that norms that are changing will be simultaneously losing symbolic significance and gaining instrumental importance. An elegant manifestation of the process would occur should values shift enough to leave information and information-based analysis as the true basis of organizational action that is legitimized by symbols of ambiguity and intuition.

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A Comparison of Models of Role Orientations of Professionals in a Research-Oriented University

Nancy Brandon Tuma and Andrew J. Grimes

In this paper we summarize existing ideas about dimensions of role orientations of professionals in terms of five models. The preferred model has five dimensions: professional commitment, commitment to organizational goals, organizational immobility, external orientation, and concern with advancement. We propose that three mechanisms generate associations between dimensions of role orientations: cognitive congruence, organizational selection, and behavioral feedback. The first mechanism implies that associations between dimensions do not vary across organizations; the other two imply that associations between dimensions depend on organizational structures and processes. Confirmatory factor analyses of data from faculty and administrators at a large research-oriented university clearly favored the preferred model over the other four. Moreover, the correlations between the dimensions of this model differed in some striking ways from associations found previously between comparable dimensions in liberal arts colleges; this suggests that organizational structures and processes shape role orientations of professionals. We conclude that the organizational context must be explicitly included in theories dealing with role orientations of professionals.•

Much of the literature on professionals in organizations rests on several presuppositions with which we disagree. The traditional view has been: (1) that a person's values, attitudes, and expectations associated with professional and organizational roles (role orientations) are formed during some early period of socialization and thereafter change little; (2) that certain associations between conceptually distinct aspects of role orientations are natural and ubiquitous; and (3) that role orientations determine the degree to which professionals act to achieve professional and organizational goals. In contrast, we think: (1) that role orientations, though influenced by early training and experience, are malleable and change in response to the structure of opportunities within an organization and profession; (2) that patterns of associations between dimensions of role orientations within organizations can vary widely, and that the specific pattern depends on the structure of the organization and the structure of the profession; and (3) that the organizational and professional settings are as important as a person's role orientations in determining how the person performs professional and organizational roles.

These arguments cannot be developed completely within a single short paper, nor can they be fully tested with available data. So though all three assertions made above underlie the research reported in this paper, we focus on the second assertion, which we could best study empirically. We argue that studies of role orientations of professionals should be studies of how organizations affect their members' ways of interpreting and approaching the world rather than studies of individual psychology in an organizational context. Secondarily, we suggest some ways that organizations affect role orientations of their members.

The data analyzed consist of questionnaire responses from faculty and administrators at a single large research-oriented

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university. Though data from widely varying types of colleges and universities would have been preferable, data from this organization, which presents markedly different values and opportunities than the liberal arts colleges typically studied, suffice to cast doubt on the widely held view that organizational characteristics are irrelevant in studying role orientations.

The methods of analysis used in this study represent a considerable advance over those used in past studies of role orientations. The main tool is confirmatory factor analysis (Joreskog, 1970), which has two desirable features. First, it permits estimation and comparative tests of nested models of role orientations of professionals. Second, it allows estimation of the correlations among dimensions of role orientations. The factor analytic methods that have commonly been used assume that different dimensions are uncorrelated; they do not permit this assumption to be tested.

THEORETICAL ISSUES AND ARGUMENTS

Five Models of Role Orientations

Model I. The most influential model of role orientations of professionals has been Gouldner's (1957) idea of a single cosmopolitan-local continuum of role orientations. He identified three variables specifying a person's position on this continuum: commitment to professional skills and values (hereafter called professional commitment), organizational loyalty (hereafter called organizational commitment), and reference group orientation. Gouldner regarded these variables as being so highly associated that they form a single dimension: cosmopolitans are high on professional commitment, low on organizational commitment, and externally oriented; locals are low on professional commitment, high on organizational commitment, and internally oriented.

The assumption of unidimensional role orientations appears highly dubious even on the basis of Gouldner's (1958) own research, as noted by Grimes and Berger (1970). In addition, it has been questioned by others who have supplied additional evidence against it. Bennis et al. (1958) found that more professionally oriented nurses were as loyal to their hospital and more loyal to their work group than those less professionally oriented. Blau and Scott (1962) found that among social workers professional commitment and an external orientation were positively associated, but nearly 40 percent of these workers did not fit Gouldner's cosmopolitan-local pattern. Furthermore, they reported that reference group orientation was related more strongly to organizational commitment than to professional commitment, though neither relationship was strong.

Model II. The most common elaboration of Gouldner's original scheme has been a two-dimensional model in which one dimension refers to professional commitment (sometimes called a cosmopolitan orientation) and a second refers to organizational commitment (sometimes called a local orientation). Those adopting some variation of this model include Blau and Scott (1962), Kornhauser (1962), Glaser (1963, 1964), Goldberg, Baker, and Rubenstein (1965), Thornton (1970), Miller and Wager (1971), Sheldon (1971), Goldberg (1976), London, Cheney, and Travis (1977), and Jauch, Glueck, and

Osborn (1978). Some have thought in terms of a fourfold typology constructed by combining high and low values on the two dimensions, so that "cosmopolitan-locals" (those high on both dimensions) and "indifferents" (those low on both dimensions) are added to Gouldner's "pure cosmopolitans" and "pure locals." Others simply have regarded the two dimensions as two negatively correlated variables.

Model III. Two-dimensional models ignore reference group orientation, the third concept that Gouldner used to identify cosmopolitans and locals. There are at least two reasons for regarding it as a third, separate dimension.

First, it is reasonable that "pure cosmopolitans" are mainly oriented externally (to others in their profession, most of whom are outside the organization) and that "pure locals" are mainly oriented internally (to members of the employing organization). But it is not clear what to expect for "cosmopolitan-locals" and "indifferents." The latter two types could be oriented internally or externally depending on the characteristics of the organization and their opportunities for interaction within and without the organization.

Second, whether people with a given level of professional commitment are oriented externally or internally may depend on characteristics of their profession and organization. For those in professions that produce knowledge (e.g., academics, scientists), career-long interaction with others in their field is usually essential to professional performance. In professions that apply existing knowledge (e.g., teachers, nurses), interaction with fellow professionals is much less important for professional performance and may be confined primarily to a period of formal professional training. Thus, a high professional commitment might be associated with an external reference group orientation (hereafter called an external orientation) in professions producing knowledge, but not in professions applying knowledge. As explained later, there may be variations across organizations that are comparable to these variations across professions.

Model IV. Empirical studies of role orientations of professionals have used diverse indicators of organizational commitment. Factor analyses of these items have suggested different aspects of this commitment. Two of these seem especially important in explaining professionals' behavior: commitment to organizational goals and organizational immobility.

An employing organization is concerned about employees' commitment to organizational goals (typically, its profitability and reputation). This notion underlies the factor called "organizational responsibility" in Goldberg, Baker, and Rubenstein's (1965) study of managers and professionals in a research laboratory. It is also exemplified by the factor called "institutional research ethic" in Berger and Grimes' (1973) study of faculty in 46 business schools.

Gouldner emphasized another aspect of organizational commitment — organizational immobility, which he called "organizational loyalty." For him, a loyal person is "one who is regarded as having totally committed his career aspirations to his employing company and as having indicated that he wishes to remain with it indefinitely" (Gouldner, 1957: 288). Several subsequent investigators (e.g. Blau and Scott, 1962; Berger and Grimes, 1973; London, Cheney, and Travis, 1977) have also equated immobility with loyalty.

Most authors designating immobility as loyalty implicitly have assumed that immobility increases commitment to organizational goals, which need not be true (March and Simon, 1957). Professionals may be immobile not because they are committed to organizational goals but because they have limited job opportunities elsewhere or because mobility entails high costs (e.g., for married female professionals) or few benefits (e.g., for those nearing retirement). Moreover, mobile people (those planning to leave the organization eventually) can be committed to organizational goals during their employment. Consequently, we hypothesize that these two aspects of organizational commitment are empirically as well as conceptually distinct. Thus, Model IV is like Model III, except that organizational commitment is divided into commitment to organizational goals and organizational immobility.

Model V. The last model is like Model IV, except that it adds a fifth dimension: concern with advancement, which is a reinterpretation of a factor called "risk of research ethic" by Berger and Grimes (1973). Unlike the other dimensions, concern with advancement is a commitment not to an external audience (e.g., the profession or the organization) but to the basic societal value of "getting ahead," although characteristics of the profession and organization shape the way advancement is defined and realized. Thus, concern with advancement describes tendencies to behave in particular ways that further advancement, quite aside from a person's commitments to professional and organizational goals.

Summary. The five models of role orientations discussed above are summarized in Table 1 (the same abbreviations are used in subsequent tables). The first is Gouldner's original model; the others are based on the arguments and empirical findings of subsequent investigators. We have argued that the five dimensions in Model V are empirically as well as conceptually distinct; in other words, we hypothesize that Model V cannot be subsumed satisfactorily under any of the four preceding, simpler models.

Table 1

Five Models of Role Orientations of Professionals in Organizations

Model I	(1)	CL	(cosmopolitanism-localism)
Model II	(1)	PC	(professional commitment)
	(2)	OC	(organizational commitment)
Model III	(1)	PC	
	(2)	OC	
	(3)	EO	(external [reference group] orientation)
Model IV	(1)	PC	
	(2)	COG	(commitment to organizational goals)
	(3)	OI	(organizational immobility or "loyalty")
	(4)	EO	
Model V	(1)	PC	
	(2)	COG	
	(3)	OI	
	(4)	EO	
	(5)	CA	(concern with advancement)

Associations among Dimensions of Role Orientations

Past discussions of role orientations of professionals have centered on which conceptually distinct dimensions of role orientations covary so highly that they are empirically indistinguishable. There has been little debate, however, about the way various dimensions are associated with one another or why particular associations arise. These issues deserve attention. Three mechanisms might generate associations among dimensions of role orientations: cognitive congruence, organizational selection, and behavioral feedback.

According to the first mechanism, a person's position on one dimension directly influences his position on others because certain positions on various dimensions are cognitively congruent (balanced). For example, when professional and organizational goals conflict, high (low) professional commitment is congruent with low (high) commitment to organizational goals; therefore these two dimensions are negatively associated. When these goals do not conflict, they are congruent and therefore positively associated (see Glaser, 1963, 1964). This mechanism seems to be the rationale for the common supposition that there are positive associations between commitment to organizational goals and organizational immobility, between an external orientation and professional commitment, and between an internal orientation and organizational commitment (both commitment to organizational goals and organizational immobility).

The second mechanism assumes that dimensions of role orientations are not naturally (i.e., cognitively) associated in any particular way. Organizational selection means that particular associations arise in an organization because it values highly particular dimensions of role orientations (and related behaviors) and uses these dimensions as the basis for selecting (hiring and retaining) its members. Organizations vary in the dimensions involved in selecting members; therefore the associations between dimensions vary across organizations.

For example, some organizations (e.g., research-oriented universities) especially value a person's professional commitment and behavior (e.g., professional publications). Others (e.g., community colleges) especially value a person's commitment to organizational goals (e.g., administrative work, teaching). If an organization selects its members on the basis of only one of these two dimensions, the association between professional and organizational commitments should be the same as in the overall population, namely, zero, assuming the two dimensions are cognitively unrelated. On the other hand, some organizations value both high professional commitment and high commitment to organizational goals. Though such organizations prefer members who are high on both dimensions, they often accept those lower than average on one dimension who are higher than average on the other. (Of course, they try to exclude those low on both dimensions.) As a consequence of this selection, professional commitment and commitment to organizational goals come to be negatively associated within such organizations.

The fact that both the first and second mechanisms can account for a negative association between professional and organizational commitments may blur key differences between the two. One important difference is in their predictions about associations between other dimensions of role orientations. For example, as already noted, according to the first mechanism, commitment to organizational goals, organizational immobility, and an internal orientation are cognitively congruent and therefore positively associated. According to the second mechanism, these dimensions are negatively associated within organizations that select members on the basis of all three dimensions.

An even more important difference between the first and second mechanisms concerns their predictions about the way an association between two dimensions varies across organizations. Because cognitive processes operate independently of the organizational context, the first mechanism implies that dimensions of role orientations have the same association in every organization. In contrast, the second mechanism predicts that associations between dimensions of role orientations vary across organizations according to the criteria used to select members. Two dimensions are not associated in organizations selecting members on the basis of only one of the two dimensions, but they are negatively associated in organizations choosing members on the basis of both, as long as outstanding performance in one area compensates for a deficiency in the other.

The first two mechanisms assume that role orientations are stable properties of persons and do not change in response to opportunities within the organization and the profession. Behavioral feedback (the third mechanism) predicts that a person's position on one dimension affects some aspect of his behavior, which in turn influences his position on some other dimension. Thus, a person's role orientations may shift as his opportunities to behave in particular ways vary. Moreover, if organizations influence behaviors that in turn affect members' role orientations, then behavioral feedback means that organizations actively shape their members' role orientations.

For example, consider the association between professional commitment and an external orientation. Presumably professional commitment fosters professional behavior and thereby also increases frequency of contact with professionals outside the organization; greater interaction with external professionals may heighten a person's external orientation. Because of behavioral feedback, professional commitment and an external orientation come to be positively associated, even if they are not cognitively congruent. Moreover, the strength of this positive association is apt to vary across organizations. Some organizations facilitate professional behavior (e.g., pay for trips to professional meetings); others do not. If behavioral feedback operates, the positive association between professional commitment and an external orientation should be stronger in the former organizations than in the latter.

We have not yet commented on associations between concern with advancement and the other dimensions of Model V. We think that the third mechanism is especially important in generating associations between this dimension and the others. In general we expect concern with advancement to foster both professional behavior and organizational behavior (that valued by the organization and not the profession, such as administrative work). If concern with advancement increases professional behavior, then because of behavioral feedback it should increase professional commitment, an external orientation, and organizational mobility (assuming professional advancement mainly involves interorganizational moves). If it increases organizational behavior, then because of behavioral feedback it should also increase commitment to organizational goals, organizational immobility, and an internal orientation. Thus, we expect concern with advancement to be positively related to both professional commitment and commitment to organizational goals in all organizations. However, the former association should be stronger in organizations that encourage professional behavior (such as the research-oriented university we studied); the latter association should be stronger in organizations that deemphasize it. Similarly, in the former type of organization we expect concern with advancement to be positively associated with an external orientation and negatively related to organizational immobility. In the latter type we expect the opposite.

Realistically, all three mechanisms discussed above probably operate to some extent. If so, the association between any two dimensions of role orientations is apt to be some compromise between tendencies predicted by each mechanism. When either the second or the third mechanism operates, dimensions of role orientation have different associations in different kinds of organizations. Then role orientations of professionals are an outcome of an organization's structure as well as a determinant of its members' behaviors. Role orientations result from organizational processes, not just psychological processes.

RESEARCH METHODS

Sample

In May, 1975, we mailed questionnaires to the 1,135 full-time faculty and administrators at a large, research-oriented university. Instructions carefully dissociated the study from the university to minimize biases in responses pertaining to commitment to organizational goals, plans to stay in the university, etc. Perhaps because of this, fewer questionnaires (34.6 percent or 393) were returned than in typical studies having official sponsorship. The response rate was comparable to that in other studies lacking official support (e.g., Flango and Brumbaugh, 1974; Cuchi and Johnson, 1978). Missing information on selected items reduced the sample analyzed to 298 (26.3 percent).

To see if the sample analyzed was representative of the 1,135 persons in the population, we performed two sorts of checks. First, we compared the sample with the population, insofar as existing university records allowed — on academic rank, school, sex, and participation in administrative activities. Sample and population naturally differ somewhat, but the differences were well within the range of chance variation. Second, we compared the responses of the sample analyzed with the responses of two other samples: the 8.3 percent of the population who responded to our 1975 survey but had missing data on some key items (causing them to be dropped from our analyses), and another 16.7 percent who did not respond to our 1975 survey but did reply to a follow-up query in 1978. For each of the roughly 90 comparable items, the means of the responses for the two other samples were well within one standard deviation of the mean for the sample analyzed. This suggests that the sample analyzed was not unrepresentative of the population.

Questionnaire

The questionnaire contained items on attitudes, personal characteristics (e.g., type of degree), organizational position (e.g., academic rank), and behavior (e.g., number of publications). We used selected items of each kind in our analyses.

The questions on attitudes were of two types. Type A asked: "When you evaluate your research (or creative project) ideas, . . . , how much importance do you usually attach to the following?" Type B said: "Please indicate the degree to which you agree or disagree with the following statements." Scales for both types ranged from 1 to 7, with 7 denoting the most importance (A) or agreement (B).

Characteristics of individuals, their positions in the organization, and their reported behaviors also fell into two types. Those labelled D were dummy (0 – 1) variables. The others were metric variables, labelled M. A few variables, though metric in concept, were phrased as ordered categories. For example, respondents were asked "About how many students do you know well?" and given "none," "1 – 5," "6 – 10," etc., as possible responses. We recorded none as zero, 1 – 5 as 3, etc.

Confirmatory Factor Analysis

The technical details of confirmatory factor analysis may be found in Joreskog (1970) or Lawley and Maxwell (1971). It is similar in many ways to the most common kind of exploratory factor analysis, principal-factors analysis, but it differs in some important ways.

Both are special cases of the general linear model and thus assume that sample observations on a vector of J observed variables $\mathbf{y}$ (e.g., the attitudinal items) are drawn from a population in which each y is a linear function of a vector of K unobservable variables $\mathbf{f} = \{f_1, \ldots, f_K\}$ (e.g., the dimensions of role orientations):

$$y_j = b_1 f_1 + \ldots + b_K f_K + \epsilon_j$$

$j = 1, \ldots, J$, where ϵ_j is a random error with mean zero and variance Θ_j. In vector notation these J equations are:

$$\mathbf{y} = \mathbf{b}' \mathbf{f} + \epsilon$$

In both types of factor analysis, random errors are assumed to be independent and therefore uncorrelated. In both kinds of factor analysis, estimated parameters usually called factor loadings (denoted by b) give the relationship between the unobserved dimension (factor) and a particular observed item; they are analogous to regression coefficients. The number of factors K is fixed by the investigator in confirmatory factor analysis and usually also in principal-factors analysis.

Because the f's are not observed, there is no unique set of estimates $\mathbf{b}$, Θ, and the variance-covariance matrix of the f's (denoted by Φ below) unless K equals 1. To obtain unique estimates, one must impose certain restrictions, which vary with the type of factor analysis. The most common type of principal-factors analysis assumes that Φ equals an identity matrix (i.e., that the f's are uncorrelated and have a variance of

1). Then b and Θ can be estimated. Identifying assumptions in confirmatory factor analyses range widely. We assume that certain b's are zero — that is, that certain items are unrelated to certain dimensions of role orientations — and that the variance of each dimension or factor is 1. Then one can estimate the b's not assumed to be zero, Θ, and the covariance matrix Φ (equivalent to the correlation matrix between dimensions under these restrictions).

In each type of factor analysis, parameters can be estimated by various methods. We used the method of maximum likelihood. Unlike the method of least squares, this method requires an additional assumption — that the random errors ϵ are normally distributed. In return this method allows standard errors of parameters to be estimated and the relative fit of nested models to be assessed through a likelihood ratio test.

FINDINGS

Confirmatory Factor Results for Model V

We begin with confirmatory factor results for Model V. We discuss these findings in some detail because comparison of the fit of Models I through V to the data showed that Model V improved upon the others significantly (.05 level of significance used throughout).

Indicators for Model V. The first step in confirmatory factor analysis consists of specifying indicators of the unobserved, underlying dimensions. We used only attitudinal items — those dealing with a person's beliefs, values, preferences and expectations — as indicators of role orientations because indicators that describe a person's background, behavior, profession, and organizational position make it impossible to study the causes and consequences of role orientations.

The survey included the 35 attitudinal items used in the research of Berger and Grimes (1973). In a principal-components analysis of these 35 items, Berger and Grimes found that five orthogonal factors explained most of the response variation in their data. Based on inspection of the items with strong loadings in their analysis (Berger and Grimes, 1973: 228), we regarded their factors as measures of the dimensions of Model V for university faculty. In the present study we treated any of the 35 items with a strong loading (one less than −.30 or greater than +.30) on one of their factors as an indicator of the dimension corresponding to that factor. Under this rule we dropped three items weakly related to every factor, giving 32 items in initial analyses. To facilitate replication of our work, we performed a second round of confirmatory factor analyses using 19 of the 32 items that were strongly related to the five dimensions of Model V both conceptually and empirically. In particular, we eliminated 13 items that had small loadings (−.50 to + .50) or were moderately related to more than one dimension. We concentrate on the 19-item analyses because the findings for the 19- and 32-item analyses differ only trivially. Both the 19-item and the 32-item analyses were reported in Tuma and Grimes (1979).

Table 2 gives the maximum likelihood estimates of the loadings on the five dimensions. Loadings on all items were in the expected direction and differed significantly from zero. The qualitative pattern of the factor loadings was remarkably similar

Table 2

Estimated Factor Loadings and Explained Variation (R^2) for Items Serving as Indicators of Dimensions in Model

Item* No.	Item† Type	Item Content	PC	COG	OI	EO	CA	R^2
			Factor Loadings					
1 (9)	A	Originality	.72	—‡	—	—	—	.40
2 (5)	A	New breakthrough in knowledge	.89	—	—	—	—	.48
3 (12)	A	Challenge of the idea	.50	—	—	—	—	.23
4 (14)	A	Theoretical relevance for existing knowledge	.76	—	—	—	—	.28
5 (16)	A	Contribution to the university's status in the local and state communities	—	1.06	—	—	—	.43
6 (7)	A	Improvement of the university's reputation in your profession	—	1.46	—	—	—	.66
7 (8)	A	Helping to achieve your department's goals	—	1.20	—	—	—	.43
8 (1)	A	Tacit or explicit approval of departmental peers	—	.81	—	—	—	.26
9 (33)	B	You would leave your school if a job at a higher salary were offered you at a substantially more prestigious university	—	—	−1.75	—	—	.72
10 (24)	B	You would not leave your school if a job were offered you at a substantially more prestigious university	—	—	1.59	—	—	.66
11 (25)	B	Barring unforeseen changes, you have no plans to leave	—	—	.63	—	—	.11
12 (27)	B	You would leave your school if a job at a lower salary were offered you at a substantially more prestigious university	—	—	−.78	—	—	.20
13 (26)	B	It is unfortunate, but true, that there really are very few people in my department with whom I can share professional interests	—	—	—	1.65	—	.58
14 (35)	B	I get most of my intellectual stimulation from my department colleagues	—	—	—	−1.28	—	.53
15 (19)	B	I get most of my intellectual stimulation from professional associations at other institutions	—	—	—	.75	—	.18
16 (17)	A	Project's risk of bearing fruition	—	—	—	—	.56	.13
17 (13)	A	Length of time to complete project	—	—	—	—	.55	.13
18 (3)	A	Increases chances for promotion	—	—	—	—	1.43	.43
19 (4)	A	Opportunity to write an article for an academic or professional journal	—	—	—	—	1.18	.48

*The item number in parentheses refers to the identifier in Berger and Grimes (1973).
†See text.
‡A dash indicates that the factor loading was constrained to be zero; see text.
§PC = professional commitment; COG = commitment to organizational goals; OI = organizational immobility; EO = externality of reference group orientation; CA = concern with advancement.

to that reported by Berger and Grimes (1973).[1] This similarity suggests (1) that the academic setting has only trivial effects on the relationship between the indicators and the underlying dimensions of Model V, and (2) that the dimensions of Model V are empirically distinguishable in a variety of universities.

Professional Commitment. Items 1, 2, and 4, which deal with the importance of originality and breakthroughs in choice of a research project, had the strongest loadings on professional

[1] Table 2 includes the item numbers of Berger and Grimes (1973) to facilitate comparison of our estimated loadings with theirs. Because of different scales for indicators, factor loadings have opposite signs in the two studies.

commitment. Item 3, the importance of an idea's challenge, had the fourth highest loading; this item connotes a positive attitude toward producing new knowledge. We regard such items as indicators of professional commitment of university faculty because members of a particular academic discipline are expected to produce knowledge. Clearly they are not good indicators of professional commitment for every profession (e.g., nurses).

Commitment to Organizational Goals. Of the four items used as indicators of commitment to organizational goals, the ones with the largest loadings were 5, 6, and 7, which asked the importance of enhancing the university's reputation and of achieving departmental goals in the respondent's choice of a research project. These are good indicators of commitment to organizational goals for faculty at research-oriented universities (though not liberal arts colleges). Item 8, which deals with the importance of the approval of departmental peers in choice of a research project, had a somewhat smaller loading, but it also seems relevant to a faculty member's commitment to organizational goals.

Organizational Immobility. The four indicators of organizational immobility (items 9, 10, 11, and 12) ask about the conditions under which the respondent expected to remain at the university. All four have strong face validity as measures of immobility. The factor loadings for these four items ranged from moderate to high.

External Orientation. The indicators of an external orientation were items 13, 14, and 15, which ask the degree to which those inside and outside the university are primary sources of intellectual stimulation and the degree to which professional interests are shared with other persons within the university. Factor loadings for these items were moderately large.

Concern with Advancement. Items 16, 17, 18, and 19 served as the indicators of concern with advancement. The factor loadings were largest for items 18 and 19, which ask the importance of opportunities for promotion and publication in choice of a research project. Items 16 and 17, which deal with the importance of a project's riskiness and with the importance of completion time in choosing research, also had fairly strong relationships to the dimension. All four items seem to be good indicators of concern with advancement for university faculty at a research-oriented university.

Correlations Between Dimensions

The estimated correlations between the five dimensions of Model V (Table 3) indicated that associations between dimensions of role orientations result not only from cognitive congruence but also from organizational selection and behavioral feedback.

First, very small, insignificant correlations occurred between professional commitment and both commitment to organizational goals (+.03) and organizational immobility (+.05). The positive signs of these correlations contradict Gouldner's (1957) assumption that professional and organizational commitments invariably have a strong negative relationship. Moreover, these correlations were too near zero to provide convincing evidence for Glaser's (1963, 1964) hypothesis that professional and organizational commitments are positively associated in organizations that encourage professional behavior. Thus, these findings cast doubt on claims that cognitive congruence is the sole mechanism generating associations between these dimensions. However, they are consistent with the hypothesis that positive cognitive congruence between professional and organizational commitments is offset by selective elimination from the organization of personnel who are neither professionally nor organizationally committed. They are also consistent with the hypothesis that there is no intrinsic cognitive relationship between professional and organizational commitments and with the hypothesis that the university's personnel are selected purely on the basis of professional commitment and behavior.

Table 3

Estimated Correlations Among Dimensions of Model V*

	PC	COG	OI	EO
PC	—			
COG	.03	—		
OI	.05	−.03	—	
EO	.08	−.38•	−.19•	—
CA	.12	.30•	−.33•	.09

•$p < .05$
*PC = professional commitment; COG = commitment to organizational goals; OI = organizational immobility; EO = externality of reference group orientation; CA = concern with advancement.

Professional commitment also had the expected positive correlation with an external orientation (+.08), though it did not differ significantly from zero. The positive sign fits predictions based on cognitive congruence and behavioral feedback. The weakness of the association is a little surprising; it suggests that the university selects personnel on the basis of both dimensions, which would tend to induce a negative relationship between them.

Contrary to the implicit assumptions of Gouldner (1957) and of many others, the correlation between commitment to organizational goals and organizational immobility was very small and insignificant (−.03). Again, organizational selection on the basis of both dimensions may induce a negative association between them that counteracts positive associations resulting from cognitive congruence and behavioral feedback.

Even though commitment to organizational goals and organizational immobility were barely correlated with one another, both had significant negative correlations with an external orientation (−.38 and −.19, respectively), as predicted by both cognitive congruence and behavioral feedback. The negative signs agree with Gouldner's (1957) notion that organizational commitment (to which these dimensions are conceptually related) and an internal orientation are positively associated. But the correlations were much too small to support his assertion that an internal orientation and organizational commitment are two facets of localism.

The correlations between concern with advancement and the other dimensions mainly agreed with our predictions. Concern with advancement was positively correlated with both professional commitment (+.12) and commitment to organizational goals (+.30); at the same time it was negatively correlated with organizational immobility (−.33). The first of these associations, which did not differ significantly from zero, was somewhat weaker than expected, but the other two were actually somewhat stronger than expected. These results support the claim that those more concerned with advancement tend to have greater commitment to the goals of both the profession and the organization, but are less willing to view the present organization as the sole arena in which they may advance. The finding that the significant correlations between concern with advancement and two different aspects of organizational commitment had opposite signs indirectly supports the contention that these two aspects are empirically as well as conceptually distinct.

Finally, the correlation between concern with advancement and an external orientation was positive but insignificant (+.09). The sign of this relationship is consistent with the claim that behavioral feedback leads those more concerned with advancement to be externally oriented in organizations that emphasize professional behavior.

Tests of the Comparative Fit of Models I through V

The agreement between the results for Model V and our hypotheses suggests, but does not prove, that Model V fits the data better than Models I through IV. To test relative fit, it is necessary to specify the indicators of Models I through IV, estimate each model, and then test whether Model V explains the observed data significantly better than each of the other models.

Statistical procedures for testing the relative fit of two different models require that one model be "nested" within the other. That is, one model must be a more restricted (constrained) version of the other. For example, in linear regression analysis one tests whether the effects of a block of variables differ significantly from zero by comparing the fit of the model that omits the block (the restricted model) with the fit of the model that includes it (the unrestricted model). In omitting the block of variables one in effect constrains coefficients of omitted variables to be zero.

In this study we expressed Models I through IV as restricted versions of Model V, the unrestricted model. Unlike the usual linear regression case, one cannot just "omit" dimensions because they are not observed variables that can be directly manipulated. Omitting indicators also does not achieve the objective because the purpose is to compare models with different dimensions rather than to examine the usefulness of particular items as indicators of role orientations. The fundamental question is whether the five dimensions of Model V can be explained by the dimensions in one of the other models.

Table 4 lists the four models tested against Model V. It includes the postulated dimensions of each model and indicates how we expressed each model as a restricted version of Model V (for a similar approach, see Werts, Joreskog, and Linn, 1973: 1483). The first four restrictions for Model IV equate its four dimensions with the first four dimensions of Model V. The fifth restriction for Model IV distinguishes the two models: the

Table 4

Likelihood Ratio Tests Comparing Models I Through IV Against Model V*

Model	Dimension	Restrictions Tested†	Likelihood Ratio Test of Model Against Model V	
			df	χ^2
I	CL	PC $= 1 \cdot$ CL	10	733
		COG $= 1 \cdot$ CL		
		OI $= 1 \cdot$ CL		
		EO $= 1 \cdot$ CL		
		CA $= 1 \cdot$ CL		
II	PC	PC $= 1 \cdot$ PC	7	507
	OC	COG $= 1 \cdot$ OC		
		OI $= 1 \cdot$ OC		
		EO $= \lambda_{41}$PC $+ c_4$OC		
		CA $= \lambda_{51}$PC $+ c_5$OC		
III	PC	PC $= 1 \cdot$ PC	5	374
	OC	COG $= 1 \cdot$ OC		
	EO	OI $= 1 \cdot$ OC		
		EO $= 1 \cdot$ EO		
		CA $= \lambda_{51}$PC $+ c_5$OC $+ \lambda_{53}$EO		
IV	PC	PC $= 1 \cdot$ PC	1	79
	COG	COG $= 1 \cdot$ COG		
	OI	OI $= 1 \cdot$ OI		
	EO	EO $= 1 \cdot$ EO		
		CA $= \lambda_{51}$PC $+ c_5$COG $+ \lambda_{53}$OI $+ \lambda_{54}$EO		

*PC = professional commitment; COG = commitment to organizational goals; OI = organizational immobility; EO = externality of reference group orientation; CA = concern with advancement.

†The λ's denote parameters that are estimated; the first subscript denotes which of Model V's dimensions is on the left side of the equation for a particular restriction while the second subscript denotes which of the dimensions of the model being tested is expected to explain the dimension on the left. The *c*'s are normalizing constants; they are necessary to achieve identification because the variables in the restrictions are not directly observed and so have no fixed scale.

equation states that concern for advancement in Model V is a linear function of the other four dimensions, which means that this dimension provides no information not contained in the other four dimensions.

Restrictions for Model III are similar to those for Model IV except that two dimensions in Model V, commitment to organizational goals and organizational immobility, are constrained to equal the same underlying dimension (organizational commitment) in Model III. Model II has restrictions resembling those of Model III except that an external orientation is expressed as a linear function of professional and organizational commitments. Finally, the restrictions for Model I say that a single underlying dimension (cosmopolitan-localism) explains each dimension of Model V.

Table 4 gives the values of χ^2 for the likelihood ratio tests of the restrictions used to specify Models I through IV. On the basis of these values of χ^2, the restrictions can be rejected; Model V explained the data significantly better than each of the other models.

The values of χ^2 in Table 4 can be used to compare Models I through IV with each other. To compare two models, one computes a value of χ^2 and its degrees of freedom by taking the difference of the corresponding values for the two models. For example, consider the comparison of Models III and IV, which tests the gain in explanatory power that comes from distinguishing between two kinds of organizational commitment — commitment to organizational goals and organizational immobility. The value of χ^2 is 295 (374 minus 79) with 4 degrees of freedom This value implies that the two kinds of organizational commitment differed significantly from one another in these data, which is not surprising given their essentially zero correlation in Table 3. Similar tests (not reported here) comparing Model II with Model III and Model I with Model II showed that each additional dimension led to a significant improvement in explaining the data.

Correlates of Role Orientations

The fundamental reason for studying role orientations of professionals is to explain their behavior better; in turn, one would like to explain how a person's role orientations are formed. Unfortunately, with cross-sectional data one can examine only the correlates of dimensions of role orientations and cannot study causal relationships. Thus, with our data we cannot distinguish empirically between two alternative explanations of observed associations between role orientations and nonattitudinal variables. First, as customarily assumed, a person's background (e.g., level and type of professional training) may cause his role orientations, which in turn may cause his behavior. Second, an organization may allocate people to positions on the basis of their background and then constrain their behavior into narrow channels; professionals may then adjust their role orientations to match their behavior to reduce cognitive dissonance (Salancik, 1977). Because both alternative explanations seem plausible (see Deutscher, 1973: 127–129), we treated associations between role orientations and nonattitudinal variables primarily as evidence of the conceptual validity of our operational measures.

To estimate associations between dimensions of role orientations and other variables, we first used estimates from the confirmatory factor analysis of Model V to compute factor scores. These scores gave estimates of respondents' values on the five dimensions. Next we calculated partial correlations between each estimated dimension and various nonattitudinal variables typically considered to be causes or consequences of a person's role orientations. Examination of partial rather than simple correlations minimizes spurious associations.

Table 5 lists the nonattitudinal variables with their means. It also reports statistically significant partial correlations of factor scores and nonattitudinal variables. Each partial correlation controlled for the other four dimensions and every other nonattitudinal variable tagged with a C in Table 5. The results in Table 5 imply that the relationships between role orientations and these nonattitudinal variables were not strong: only three partial correlations exceeded +.20. Still, most partial correlations had the sign that one would expect if the estimated dimensions truly measured the specified concepts. A few partial correlations were not what one would normally expect. We can only speculate about the reasons for these results; these speculations must be tested in subsequent research.

Professional Commitment. Table 5 indicates that professional commitment had, as one would hypothesize, positive partial correlations with two important aspects of professional behavior of faculty: number of professional publications in the past three years and having held a national professional office in the past three years. It also had the expected negative partial

Table 5

Statistically Significant (.05 level) Correlates of Dimensions in Model V

Variable			Partial Correlation With:*				
Type†	Mean	Name	PC	COG	OI	EO	CA
DCI	.11	Female	.10	—	—	—	—
DCI	.22	Alumni	—	—	—	–.11	—
DCI	.71	Ph.D.	—	—	—	—	—
DCI	.47	Worked Other University	—	—	—	—	—
MI	6.2	Years in Present Rank	—	—	—	—	—
DCP	.61	Prof'l School	—	.11	.13	—	—
DP	.46	No Undergrads in Dept.	—	—	.15	—	—
DCP	.47	Full Professor	—	.08	.14	—	–.24
DCP	.40	Administrator‡	—	.10	—	—	—
DCP	.66	Tenured	—	—	—	—	–.21
MP	45.6	% Time Budgeted Teaching	—	—	—	—	.10
MCP	32.2	% Time Budgeted Research	—	—	—	—	–.12
DCB	.41	Held Nat'l Prof'l Office	.13	—	.11	—	—
MCB	6.6	No. of Publications	.23	—	—	—	—
DCB	.27	AAUP Member	—	–.09	—	—	—
MB	4.8	No. of Meetings Attended	—	—	—	—	—
MB	17.8	No. of Students Known Well	—	—	—	—	—
MB	32.4	% Time Spent on Teaching	—	–.09	—	—	.13
MB	28.5	% Time Spent on Research	—	—	—	—	—
MB	8.9	% Time Spent on Admin.	—	.12	—	—	—
MB	1.9	% Time Spent on Public Serv.	—	—	—	.16	—
MB	3.4	% Time Spent Writing for Nonacademics	–.10	—	—	—	—
MB	7.3	%Time Spent Interacting with Administrators & Faculty Colleagues	—	—	—	–.18	—
MB	4.2	% Time Spent Prof'l Service	—	—	—	—	—
MB	4.1	% Time Spent Consulting	—	—	—	—	—
MB	6.8	% Time Spent Univ. Service	—	—	—	—	—

*PC = professional commitment; COG = commitment to organizational goals; OI = organizational immobility; EO = externality of reference group orientation; CA = concern with advancement.

†D = a dummy (0–1) variable; M = a metric variable; C = one of the variables controlled in partial correlations between dimensions and other variables listed in the table; I = an individual characteristic; P = a positional characteristic; B = a behavior.

‡The variable is 1 if the person held an administrative position anytime within the past three years.

correlation with a measure of nonprofessional behavior — the percentage of time spent writing for a nonacademic audience.

Professional commitment also had a significant positive partial correlation with being female. This association could have arisen because women are more strongly socialized to professional values in graduate school. An alternative explanation is that greater barriers to career development of women faculty cause women with low professional commitment to be less likely to work at research-oriented universities than men with low professional commitment.

Commitment to Organizational Goals. Six variables had significant partial correlations with commitment to organizational goals. Four of the six had the expected sign, though their magnitude was small. Thus, greater commitment to organizational goals was significantly associated with (1) being a full professor, (2) having been an administrator, (3) the percentage of time spent on administrative tasks, and (4) not belonging to the American Association of University Professors.

The significant negative partial correlation of this dimension with the percentage of time spent on teaching is contrary to the implicit assumption in the literature that "loyal" faculty put more effort into teaching. But it is not so surprising at the university we studied, given its great emphasis on scholarly excellence and lesser emphasis on teaching. The relationship may well be positive, as the literature suggests, in less research-oriented universities.

Finally, Table 5 indicates that commitment to organizational goals was greater among those in a professional school (e.g., medicine, business) than among those in the humanities and sciences (e.g., French, physics, economics). This unanticipated association may reflect differences between the professional and nonprofessional schools at this university (e.g., differences in prestige) or differences in the disciplines of those in the two types of schools (e.g., differences in the value of applied knowledge and activities).

Organizational Immobility. We expect organizational immobility to increase as a person ages and has fewer years to reap benefits from a move. Results in Table 5 support this hypothesis: organizational immobility had significant positive partial correlations with two indicators of age (which was not directly measured) — being a full professor and having held a national professional office in the past three years.

Organizational immobility also had significant positive partial correlations with two attributes of organizational position — being in a department with no undergraduates and being in a professional school. These associations may be particular to research-oriented universities. Faculty in such universities usually prefer to teach graduate students. Consequently, those in departments without undergraduates may be more satisfied and therefore less interested in moving to another school. The relationship with being in a professional school may result from the exceptionally high prestige of these schools: leaving is more likely to entail a move to a less prestigious school.

External Orientation. Results in Table 5 indicate that alumni with graduate degrees from the university were, as one might expect, significantly less likely to have an external orientation. In addition, the partial correlations between an external orientation and interaction had the expected sign. Thus, an external orientation had a positive partial correlation with time spent on service to the public (those outside the university) and a negative one with time spent interacting with administrators and faculty in the university.

Concern with Advancement. Not surprisingly, concern with advancement had significant negative partial correlations with indicators of how far the person had yet advanced. Full professors and tenured faculty were significantly less concerned with advancement. This dimension was also correlated significantly with attributes of a person's position that affect chances for advancement. In particular, concern with advancement tended to fall with the percentage of salary budgeted for research and to rise with the percentage of salary budgeted for teaching. This is reasonable because promotion at the university we studied depends greatly on professional reputation and less on teaching. The chance for advancement may genuinely rise with the percentage of salary budgeted for research and fall with that budgeted for teaching. Persons with better chances for advancement may be justifiably less concerned about advancement.

The positive partial correlation between concern with advancement and percentage of time spent on teaching may be considered as reasonable or not, depending on which is viewed as cause and which as effect. If time spent on teaching is exogenously determined and does not depend on role orientations, then those who spend more time on teaching are understandably more concerned about advancement, given this university's emphasis on professional reputation in its distribution of rewards. But if time spent on teaching depends on role orientations, then this relation is surprising. At the university we studied, we would expect those who are more concerned with advancement to spend less time on teaching.

CONCLUSIONS

We began by challenging three common presuppositions concerning role orientations of professionals in organizations: (1) that a person's role orientations are formed early in his career and then are stable, (2) that certain positions on conceptually distinct dimensions of role orientations invariably go together (presumably because of their cognitive congruence), and (3) that a person's role orientations determine his role behaviors. We gave special attention to the second of these presuppositions.

Based on past theoretical and empirical work, we suggested that role orientations have at least five conceptually distinct dimensions: professional commitment, commitment to organizational goals, organizational immobility (traditionally called "loyalty"), external orientation, and concern with advancement. We argue that these are empirically as well as conceptually distinct, and our empirical analysis strongly supported this claim.

Though the existing literature presupposes certain inevitable associations among dimensions of role orientations, explanations for these have received little explicit attention. We proposed three mechanisms that could generate associations between dimensions of role orientations within an organization: cognitive congruence, organizational selection, and behavioral feedback. The first, implicit in most existing literature, predicts the same associations in every organization. But the other two imply that an organization's structure affects these associations.

Though we analyzed data from only a single research-oriented university, our estimates of associations between the five dimensions of role orientations differed sufficiently from those predicted by cognitive congruence to cast doubt on the hypothesis that it alone explains such associations. In particular, we found virtually no association between professional commitment and commitment to organizational goals. This contradicts both the traditional view, first formulated by Gouldner (1957), that these two commitments are incongruent and therefore invariably negatively associated, and also Glaser's (1963, 1964) hypothesis that they are congruent and thus positively associated in organizations promoting professional behavior. Moreover, we found that the association between commitment to organizational goals and organizational immobility was nearly nonexistent, contrary to the prediction that they are positively associated because of cognitive congruence. On the basis of these and other associations found in the data, we concluded that all three mechanisms operate to some extent. Longitudinal observations on role orientations of members of widely varying types of organizations are needed to clarify the way these three mechanisms work and their relative potency.

We also examined the relationship between the five dimensions of role orientations and various attributes of a person's background, organizational position and behavior. Though we mainly used these results to check the external validity of our measures of the five dimensions, they provided some indirect evidence pertinent to the first and third presuppositions challenged in this study.

With regard to the first presupposition (that a person's role orientations are formed early in his career and then are stable), estimated partial correlations between various nonattitudinal variables and concern with advancement, organizational immobility, and (possibly) commitment to organizational goals suggested that a person's position on these dimensions varies with the stage of his career. In addition, we found significant partial correlations between role orientations and organizational position rank, department, and school). Although such associations could have arisen because of selection of persons with particular kinds of role orientations into certain segments of the organization, they could also have come about because the organization molds the role orientations of persons selected into various positions for reasons quite unrelated to their beliefs and attitudes. These findings highlight the importance of acquiring data on role orientations of individuals over time; only then can one really study how role orientations are formed, maintained, and altered when individuals are faced with different kinds of professional and organizational opportunities.

Finally, we found some clues that the relationship between role orientations and behavior is not independent of organizational context as is often assumed. For example, it is widely believed that faculty who are more committed to organizational goals spend more time and effort on teaching. However, we found the opposite relationship. In retrospect, this result seems plausible in research-oriented universities, though the ordinary assumption may indeed apply in universities that stress teaching. This result suggests that the impact of role orientations on behavior varies across organizations and organizational positions.

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A Tentative Exploration into the Amount and Equivocality of Information Processing in Organizational Work Units

Richard L. Daft and Norman B. Macintosh

A model is proposed that relates the amount and equivocality of information processing to the variety and analyzability of work-unit activities. New questionnaire scales were developed for the information and task variables, and an exploratory test of the model was conducted on 24 work units. The reported amount of information processing increased with both task variety and analyzability; the reported use of equivocal information decreased with task analyzability. The findings suggest a modification of the previously reported positive relationship between task uncertainty and amount of information processing

One requirement in all organizations is that information be processed among participants (Arrow, 1974; Williamson, 1975). In order to interpret the external environment, coordinate activities, and handle problems that arise, participants attend meetings, send and receive reports, obtain knowledge of events relevant to performance, read printouts, make technical and administrative decisions, and perhaps disseminate instructions — all of which involve information processing in some form.

The view of an organization as an information-processing system is receiving increasing theoretical and empirical attention in the literature on organization theory (Huber, O'Connell, and Cummings, 1975; Porter and Roberts, 1976; Connolly, 1977). Many aspects of structure and process that have been observed within organizations may reflect information-processing requirements (March and Simon, 1958; Katz and Kahn, 1966; Weick, 1969; Roberts et al., 1974). Galbraith (1977), for example, theorized that information processing reflects uncertainty created by diverse activities and goal difficulty. Variables in the design of organizations, such as structural self-containment and vertical information systems, should provide sufficient capacity to meet information needs. Tushman and Nadler (1978) proposed that organizational effectiveness is a function of the fit between the uncertainty caused by several task characteristics and the ability of organizational structure to provide participants with required information.

Empirical studies have indicated that organization tasks represent one source of variation in information-processing requirements. In general, complex, nonroutine tasks require more information processing than simple, routine tasks. This relationship has been observed in small groups (Bavelas, 1950; Leavitt, 1951), simulated organizations (Becker and Baloff, 1969), research and development groups (Tushman, 1978, 1979), and employment security agency subunits (Van de Ven and Ferry, 1979).

The key assumption in this developing literature is that uncertainty and the amount of information processed are closely related. This relationship is the basis for theories that relate task uncertainty to structure (Galbraith, 1977; Tushman and Nadler, 1978) and is supported by the empirical literature (Tushman, 1978, 1979; Van de Ven and Ferry, 1980). When tasks are nonroutine or highly complex, uncertainty for participants is high, and, hence, their information-processing requirement is greater for effective performance. So strong is the expectation for this relationship that uncertainty is often defined in terms of

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the amount of information available to participants (Galbraith, 1973, 1977; Tushman and Nadler, 1978).

The purpose of the research reported here is to explore further the relationship between task characteristics and information processing. The concept of task uncertainty is distinguished from the concept of information processing in definition and operationalization so that the relationship between them can be empirically analyzed. The notion of information equivocality is introduced, along with information amount, to provide a richer empirical perspective on information processing in organizations. A simple model is proposed in which tasks are organized along two dimensions that represent different sources of work-related uncertainty for participants, and these dimensions are related to the amount and equivocality of information.

PROPOSED MODEL OF INFORMATION PROCESSING

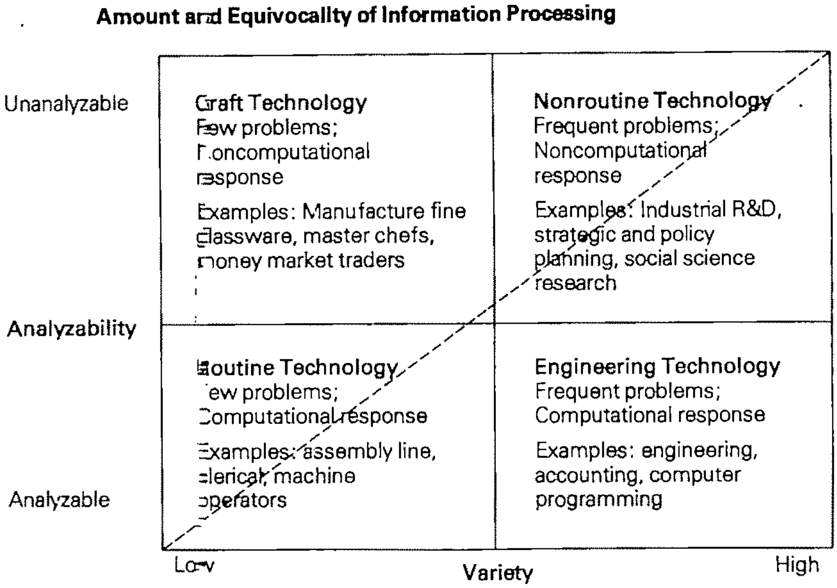
Task Characteristics

In order to distinguish task uncertainty from information processing, sources of uncertainty are identified in the task requirements of work units. Task elements are conceptualized as stimuli that vary systematically across work settings and translate into more or less uncertainty for participants. A work environment may generate uncertainty, for example, because activities are nonroutine (Tushman, 1978) or constantly changing (Duncan, 1972). Of course these stimuli must be perceived and interpreted by human participants (Downey, Hellriegel, and Slocum, 1975), who may then respond with information-processing activity.

The task characteristics identified by Perrow (1967) represent elements of task uncertainty that have been the basis for several studies of organizational structure and process (Hage and Aiken, 1969; Grimes and Klein, 1973; Van de Ven and Delbecq, 1974; Van de Ven, Delbecq, and Koenig, 1976; Comstock and Scott, 1977; Overton, Schneck, and Hazlett, 1977; Glisson, 1978). Several of these studies operationalized the dimension of routine-nonroutine work described by Perrow, and this dimension has also been proposed in models of information processing in organizations (Galbraith, 1977; Tushman and Nadler, 1978). However, the routine-nonroutine continuum orginally described by Perrow (1967) is an aggregation of two underlying task characteristics, task variety and task analyzability. The relationship between these characteristics and the routine-nonroutine diagonal is shown in Figure 1.

Task variety (Van de Ven and Delbecq, 1974) is the frequency of unexpected and novel events that occur in the conversion process. Variety represents what might be called "stimulus" uncertainty for participants (Perrow, 1970). Low variety means that participants experience considerable certainty about the occurrence of future activities; high variety means that participants typically cannot predict problems or activities in advance.

The second task characteristic is task analyzability, which concerns how individuals respond to problems that arise. When the conversion process is analyzable, participants typically follow an objective, computational procedure to resolve problems. A correct response can usually be identified. However, some work is not analyzable, so no objective, computational



Amount and Equivocality of Information Processing

Analyzability	Low Variety	High Variety
Unanalyzable	**Craft Technology** Few problems; Noncomputational response Examples: Manufacture fine glassware, master chefs, money market traders	**Nonroutine Technology** Frequent problems; Noncomputational response Examples: Industrial R&D, strategic and policy planning, social science research
Analyzable	**Routine Technology** Few problems; Computational response Examples: assembly line, clerical, machine operators	**Engineering Technology** Frequent problems; Computational response Examples: engineering, accounting, computer programming

Figure 1. Classification of work-unit technologies (Perrow).

procedure will tell a person exactly how to respond. Participants may have to spend time thinking about what to do, and they may actively search for solutions beyond normal procedures (Cyert and March, 1963). This dimension is similar to what Thompson (1967) called knowledge of cause-effect relationships. When work processes are not analyzable, participants experience what might be called "response" uncertainty. Uncertainty arises from difficulty in seeing into the task and in analyzing it in terms of alternative courses of action, costs, benefits, and outcomes.

According to Perrow's model, these two dimensions of work activity provide the basis for four general categories of work activities (Figure 1). Perrow cautioned that four categories do not mean the existence of only four types of organizations. The categories in Figure 1 simply illustrate more or less representative types of technologies that may appear in organizations. In addition, task variety and analyzability are continuous distributions, and the two dimensions are probably correlated in real organizations. The important aspect of Perrow's framework is that task activities are organized along two dimensions that may have distinctive influences on information processing.

Information

The notion of information appears frequently in the literature on organization theory, but typically without precise definition. Based on early work in psychology (Miller and Frick, 1949; Shannon and Weaver, 1949; Garner, 1962), the term has come to mean something that reduces uncertainty or entropy in a receiver. In laboratory settings, for example, the uncertainty reduction associated with information has been calculated as the improvement in the prediction of tightly controlled outcomes. This technical approach to information is too narrow for application to many real-world settings, because it does not allow for different types of uncertainty or different types of information, nor does it acknowledge that some information may decrease rather than increase the ability to predict outcomes (Driver and Streufert, 1966). Thus, in the field of information theory, the operational definition of information has evolved to reflect its more general impact on the receiver. Human beings represent what they know by pictures, symbols, verbal statements, and mental images. The symbolic picture is only a representation of reality, and a change in that representation is the effect that information has on individuals. A variety of cues and sources, including verbal languages, touch, visual observations, and computer output, may convey information if they add to the receiver's mental image. In a general sense, then, information can be defined as *that which alters a mental representation* (MacKay, 1969; Helvey, 1971). If a message is received but the meaning is already known or cannot be interpreted, no information is conveyed.

This definition provides a basis for distinguishing information from communication. Although the notions of communication and information overlap, communication theory is concerned with the physical characteristics of information and the mechanics of its transmission (MacKay, 1969). Information research generally pertains to the problem of representing and understanding the physical world, whereas communication research typically examines the problem of transmitting these representations. The outcome of a communication channel is data, which can be measured but which may not change the receiver's knowledge. To qualify as information, the data must effect a change in the individual's understanding of reality. This distinction is important to the operationalization of the information concept. Data can be counted, but simply counting pieces of data (words, numbers) or the number of transmissions (phone calls, letters) constitutes a study of communication, because interpretation and understanding on the part of the receiver are not considered.

The information dimension frequently discussed in organization theory is information amount (Hackman, 1968; Galbraith, 1973, 1977; Huber, O'Connell, and Cummings, 1975; Tushman, 1978, 1979; Tushman and Nadler, 1978). This notion is important because the organization must have the capacity to deliver sufficient information to participants, or performance may suffer (Galbraith, 1977).

The operational definition of information amount is problematic because information does not have tangible properties. Since information effects a change in a person's understanding, the amount of information conveyed is the amount of change in understanding, which is extremely difficult to identify and measure. One solution to this problem is to examine the information-processing activity of participants as an indicator of changes in understanding. Information-processing activity pertains to gathering, interpreting, and synthesizing information cues (Tushman and Nadler, 1978). When data are gathered to improve a person's understanding, the amount of information conveyed will tend to be greater than when no data are gathered. In a work situation in which an individual's understanding is adequate and additional information is not sought, the amount of data-processing activity will be low. The amount of information processing is thus defined as the *volume or quantity of data about organizational activities that is gathered and interpreted by organization participants*. This definition is consistent with the definition of information, because it considers the data that are received and interpreted in order to alter the receiver's mental representation.

Another variable in organizational information processing has been suggested by Weick (1969, 1979). Although he also views organizations as information-processing mechanisms designed to absorb uncertainty from the environment, he is concerned with equivocality of information rather than with amount. One definition of equivocality suggests that the signal itself may be clear to the receiver but that the underlying meaning is not clear because the signal has two or more causes or significations (Frick, 1959; Weick, 1979). Weick (1979) suggested the examples of a pun and a fire alarm from a district with a history of false alarms as equivocal signals, because each message presents at least two possible meanings. A second definition of information equivocality simply stresses ambiguity in the interpretation of a message, for whatever cause (MacKay, 1969). Both approaches to equivocality are based on multiple interpretations of the message. The second view is slightly broader, however, because ambiguity from signal distortion or errors would also be considered to add to equivocality (a mispronounced pun or an erratic fire alarm). These factors reduce clarity and provide additional interpretations to the receiver.

The second, somewhat broader approach to equivocality is adopted here. Information equivocality is defined as *the multiplicity of meaning conveyed by information about organizational activities.* Information that is clear and specific and that generally leads to a single, uniform interpretation by users is considered unequivocal. Information that lends itself to different and perhaps conflicting interpretations about the work context is considered equivocal information.

Model

We propose that the two dimensions of work activity described by Perrow (1967) may be systematically related to information amount and information equivocality.

Hypothesis 1. The amount of task information processed by participants will have a positive relationship with task variety.

When few problems and few unexpected situations arise, participants experience few surprises and make few day-to-day decisions. Understanding of task relationships is relatively complete, so participants can preplan to handle expected tasks and do not need to process large amounts of information (Galbraith, 1973). Information processing can be relatively small and directed toward a limited set of predictable applications. When variety is high, however, individuals are frequently confronted with unfamiliar, novel, and unexpected events. Internal representations may not cover these contingencies. Preplanning is not possible, so a greater need exists for information acquisition on an ongoing basis.

Most studies support the notion that variety or complexity in the task is associated with greater information processing (Hackman, 1968; Hage and Aiken, 1969; Hackman and Vidmar, 1970; Tushman, 1978, 1979; Van de Ven and Ferry, 1979). In addition, a wide range of problems and decisions tends to be covered in high-variety settings, so a wider scope of information has to be shared. More people also tend to be involved; hence, a greater volume of information is communicated among participants, often at the peer level (Ference, 1970; Snadowsky, 1972; Connolly, 1975, 1977; O'Reilly, 1977).

Hypothesis 2. The equivocality of task information processed by participants will have a negative relationship with task analyzability.

The reasoning of this hypothesis is that the clarity of task information will tend to reflect the underlying nature of task requirements. Weick (1969, 1979) proposed that organizations must adapt to equivocality and that the information used by the organization and the organization's responses may reflect the equivocality in the environment. This is an intriguing approach to information processing. When cause-effect relationships are well understood, information that tends to be precise and unequivocal can be developed. Measurements of task activities, as well as rules and procedures, will usually be specific and accurate and will indicate the correct response or the correct procedure to use when a problem arises. When activities are not analyzable, however, information may tend to be general and equivocal because precise coding schemes would not be congruous with the work activities.

The logic of this relationship departs from the assumption that true understanding of a phenomenon means that it can be described in unambiguous terms. Zadeh's (1973) principle of incompatibility, for instance, states that the ability to make precise yet meaningful statements about a system diminishes as the system becomes more complicated. In other words, if a work environment is fuzzy, muddled, and indescribable, then an accurate representation of that system is also fuzzy, muddled, and indescribable. Messages that are ambiguous and have multiple interpretations thus provide information that is consistent with the construction of an internal representation that captures the messy, multiple causation aspects of the system.

If organizations refuse to tolerate the processing of equivocal information, organizational health and functioning may be adversely affected (Weick, 1969). Unequivocal, precise messages can oversimplify complex, ill-defined events. On the other hand, ill-defined messages about clear, unequivocal events can also lead to misrepresentation and decision errors. Thus, the equivocality of the information processed in organizations may have to fit to some degree the equivocality of the tasks being undertaken.

Empirical studies of information equivocality in organizations have not been reported in the literature, although some speculative evidence does seem consistent with hypothesis 2. Keegan (1974) reported that managers in well-structured jobs (finance) tended to use documentary sources of information, whereas managers in less structured jobs (general management) relied heavily on face-to-face information. Randolph (1978) observed that verbal media were used less frequently by employees as technology increased in certainty. In other studies, managers, especially top managers, valued soft, spoken information over hard, formalized information because soft information provided richer insight into organizational processes (Mintzberg, 1972, 1973; Czepiel, 1975). In a similar vein, participants in high-uncertainty subunits relied mostly on unscheduled meetings for coordination, whereas participants in low-uncertainty subunits relied on rules and plans (Van de Ven, Delbecq, and Koenig, 1976).

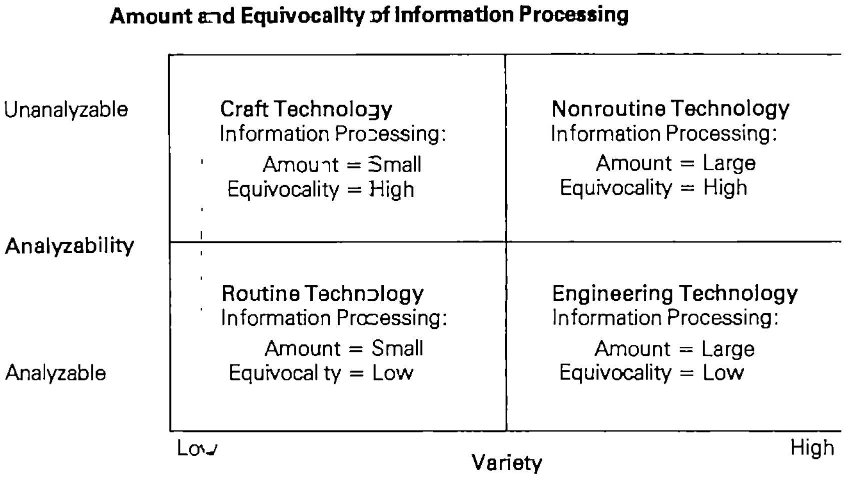


Figure 2. Proposed model of information processing.

Hypotheses 1 and 2 suggest that both the amount and the equivocality of task information processed by participants may vary systematically across organizational units, depending on task characteristics. Task characteristics are expected to be important because they represent the pattern of problems and uncertainties with which participants deal.

Figure 2 illustrates how information processing is hypothesized to occur for each of Perrow's (1967) four categories of task activities. It represents a simple, parsimonious model as the basis for an exploratory study of information processing in organizations. Many additional variables, such as size, interdependencies, environmental factors not reflected in task characteristics, and even the information predisposition of managers, may also influence information processing within organizations. This research does not explore all possible explanations for information processing. Ideas from the literature have simply been organized into what seems a plausible, although tentative, framework as a step toward improving understanding of organizations as information-processing systems.

METHOD

A variety of research strategies, including observation (Mintzberg, 1973), interviews (Keegan, 1974), and laboratory experimentation (Huber, O'Connell, and Cummings, 1975), may each provide a path of insight into the process of information processing in organizations. The research design and data collection procedures used in this study were chosen for an exploratory test of the hypothesized information patterns in a field setting. A field study takes advantage of natural variation in task characteristics, which would be extremely difficult to simulate in the laboratory.

Measurement

A single, widely used measurement scale for work-unit task characteristics has not evolved in the literature on organizations (Stanfield, 1976; Ford and Slocum, 1977). Perrow's (1967) technology concept has been the basis for several studies that have operationalized the concept of work-unit task (Hage and Aiken, 1969; Grimes and Klein, 1973; Hrebiniak, 1974; Van de Ven and Delbecq, 1974; Van de Ven, Delbecq, and Koenig, 1976; Comstock and Scott, 1977; Overton, Schneck, and

Hazlett, 1977; Glisson, 1978; Tushman, 1978; Jermier and Berkes, 1979). With the exception of Van de Ven and Delbecq (1974), however, these studies appear to have operationalized a single dimension, which was either the routine-nonroutine diagonal or the notion of task variety. Even Lynch (1974), who performed a careful construction of questionnaire instruments to measure Perrow's technology, did not measure the two dimensions originally described by Perrow. Lynch's factor analysis yielded several technology dimensions, of which three were combined into a single routine-nonroutine scale.

A similar problem existed with our attempt to measure information amount and information equivocality: no established measurement instruments were available to measure the specific dimensions of information processing that were of concern to us. Thus, the initial part of our research was devoted to developing new scales for the work-unit task and information variables.

Factor Analysis. Our measurement strategy was to construct multiple item questionnaire scales using factor analysis. A questionnaire seemed appropriate to use because the definition of information processing depends on the point of view of the information receiver. The first step in questionnaire construction was to prepare questions drawn from published sources, such as Duncan (1972) and Lynch (1974), and add items that we developed. The questions used in the final scales are shown in Table 1.

The task questions asked about task characteristics based on Perrow's theory. The variety questions asked about such things as variety and dissimilarity of work activities. The analyzability questions asked about the extent to which work activities were understood and about the availability of standard practices, to reflect Perrow's definition of analyzability. The information-processing questions focused on the data-gathering activities related to problem solving and decision making. The information amount questions asked about the extent to which data were gathered and interpreted, and the equivocality questions asked about the clarity of those data inputs.

After pretesting, the questionnaire was administered to 298 respondents in 24 work units. The administration was undertaken in two phases, each involving 12 work units. Responses from each subsample of 12 units were factor analyzed separately as a way to cross-validate the factor analysis (Table 1). There were some differences in the size of factor coefficients for certain questions in each subsample ("1st" and "2nd" columns in Table 1), but the overall factor structures were quite similar. Similar factors indicated that the factor pattern was not due to idiosyncratic characteristics of either subsample. As a final check of the underlying factor structure, the entire sample was factor analyzed. The results are given in the "All" column in Table 1.

Reliability. The internal reliability of each questionnaire scale was tested by computing Nunnally's coefficient alpha. The coefficients were as follows: analyzability (6 items) = .86; variety (5 items) = .77; amount (4 items) = .71; equivocality (3 items) = .73. Each coefficient was well above the .50 suggested for acceptable scale reliability.

Table 1

Varimax Rotated Factor Matrix of Questionnaire Items*

Questionnaire Items	Factor 1			Factor 2			Factor 3			Factor 4		
	1st	2nd	All	1st	2nd	All	1st	2nd	All	1st	2nd	All
Work-Unit Technology												
1. Task Analyzability:												
a. Normal work activities guided by standard procedures, directives, rules, etc.	.83	.61	.78†	−.04	.01	.00	−.30	−.31	−.26	.18	.09	.10
b. Know a lot of procedures and standard practices to do the work well.	.72	.73	.73†	−.09	.05	−.04	.08	−.07	.03	.16	.13	.08
c. Understandable sequence of steps that can be followed in carrying out the work.	.56	.69	.65†	−.17	.04	−.10	−.11	−.31	−.14	.01	.07	.08
d. People actually rely on established procedures and practices.	.83	.74	.83†	−.13	.04	−.02	−.16	−.25	−.12	.07	.15	.09
e. Established materials (manuals, standards, directives, statutes, technical and professional books, and the like) cover the work.	.71	.44	.66†	−.13	.06	−.08	−.09	.06	−.00	.03	.06	.11
2. Variety (Exceptions):												
a. Variety in the events that cause the work.	−.25	.09	−.03	.03	.13	.09	.59	.63	.55†	.28	.06	.15
b. Describe the work as routine.	.47	.29	.50†	−.07	−.15	−.07	−.55	−.46	−.42†	.05	.01	−.01
c. Work decisions dissimilar from one day to the next.	−.11	−.04	−.11	[illegible]	.11	.10	[illegible]	[illegible]	[illegible]	[illegible]	.01	.10
d. Takes a lot of experience and training to know what to do when a problem arises.	.20	.49	.17	.02	.00	−.01	.45	.20	.45†	.14	−.04	.08
e. Tasks require an extensive and demanding search for a solution.	−.16	−.04	−.21	.02	.01	−.02	.63	.74	.71†	.05	.00	.07
Work-Unit Information Processing												
1. Amount:												
a. Wait until all relevant information is examined before deciding something.	.16	.30	.19	−.19	−.15	−.14	.03	.13	.13	.40	.62	.67†
b. Keep gathering data until an excellent solution emerges.	.03	.08	.02	−.16	.20	.11	.05	.02	.02	.54	.67	.41†
c. Acquire all possible information before making a final decision.	.18	.17	.09	−.24	.03	−.02	.36	.10	−.01	.42	.70	.59†
d. Go over available information until an excellent solution appears.	.16	.08	.12	.12	.02	.08	.01	.02	−.00	.46	.67	.65†
2. Equivocality:												
a. Information can be interpreted in several ways and can lead to different but acceptable solutions.	−.03	.06	.01	.86	.89	.89†	−.01	.23	.11	.06	−.01	−.04
b. Information used in making decisions means different things to different people.	−.23	.01	−.08	.50	.54	.50†	.14	.01	−.02	−.14	−.04	−.01
c. More than one satisfactory solution for problems faced.	−.15	−.04	−.09	.65	.70	.71†	.00	.11	.09	.08	.16	.03
Percentage of common variance explained by each factor	.46	.40	.45	.23	.23	.20	.17	.16	.17	.9	.12	.11
Eigenvalue	4.6	4.0	4.5	2.3	2.2	1.9	1.7	1.6	1.7	.9	1.2	1.1

*Respondents were asked to indicate the extent to which each statement described their work or the situation in their department on a five-point Likert scale where 1 = to a very great extent, 2 = to a great extent, 3 = to some extent, 4 = to a little extent, and 5 = to a very little extent. N = 155 for the first 12 units, N = 98 for second 12, and N = 253 for total sample.

†Item used in constructing the variable.

Sample

The primary criterion for sample selection was to ensure that a wide range of tasks were included in the study. Rather than use variation within a single function, such as research and development, or units from a single organization, we included a variety of activities from several organizations. Selecting the sample on the basis of variation in the independent variables, rather than randomly, enables investigators to test whether independent variables are having the predicted impact on dependent variables (Blalock, 1961; Hall, Haas, and Johnson, 1967). Following these criteria we contacted 17 organizations, and 14 agreed to participate, which included organizations from a variety of sectors (business, government, education, service). The sample also included a variety of work units from each organization (e.g., trades, teaching, machine shop, legal, planning, accounting, etc.). Geographical limitation was also a factor in sample selection. The sample was limited to the Toronto-Ottawa-Montreal region in Ontario and Quebec, Canada, so that we could maintain personal contact with participating organizations.

Organizational units often contain diverse work activities (Perrow, 1967; Van de Ven and Delbecq, 1974; Tushman, 1979). Our original plan was to use job descriptions to identify departments with homogeneous tasks, but formal descriptions typically were not available. Organization managers worked with us to identify subunits that contained homogeneous work activities, such as plant maintenance or design engineering. Next, we identified individuals working within each of the identified departments, and all employees in sample departments were surveyed. The number of employees surveyed in each department ranged from 6 to 37, with a mean of 10.5.

The questionnaires were distributed or, in a few cases, mailed to the employees. Participation was voluntary. Completed questionnaires were collected during the site visit or were mailed anonymously to the investigators. A total of 298 questionnaires were issued, and 253 questionnaires were received and compiled. Of the 45 questionnaires not used in the study, 16 were not returned to us; 8 indicated that the respondent was not fully trained; and 21 respondents spoiled questionnaires by writing on them but not completing answers, or by checking all "1's" or "5's" despite reversal items. The unused questionnaires were randomly distributed throughout the work-unit sample. The final sample was composed of 253 fully trained, experienced individuals in 24 departments within 14 organizations.

Unit of Analysis

The unit of analysis for the study was the work unit ($N = 24$) because our theoretical relationships concerned how information processing varies across organizational units that have different work characteristics. Work-unit scores for each variable were computed by averaging the scores of respondents from each work unit. Equal weight was given to each individual.

Averaging individual responses assumes that work units have been chosen that are different from one another. The homogeneity of intraunit responses was tested with one-way analysis of variance (Dixon and Massey, 1969). The null hypothesis that all individuals were responding about similar tasks was rejected for both task analyzability ($p < .001$) and variety ($p < .001$). In addition, the validity of the work-unit task scales was tested in a separate study (Withey, Daft, and Cooper, 1980). The aggregated work-unit scores for analyzability and variety correlated highly with Van de Ven and Delbecq's (1974) measures of those dimensions, with external judges of work-unit activities, and with supervisor responses for the work unit as a whole.

Table 2

Correlation Matrix

	1	2	3	4
1. Task Variety	1.00	–.64	+.08	.48
2. Task Analyzability		1.00	.44	–.59
3. Information Amount			1.00	–.48
4. Information Equivocality				1.00
Mean	3.36	2.58	3.36	3.23
Standard Deviation	.47	.68	.47	.33

FINDINGS

Table 2 shows the zero-order correlation coefficients for the variables in the study. Across the 24 work units there was a moderate correlation between the two work-unit task dimensions ($r = -.64$), which is consistent with Perrow's (1967) theory.[1] On the average, when variety was perceived to be high, participants also reported that tasks were somewhat less analyzable.

Table 3

Partial Correlations Between Task Variety and Information Processing, Controlling for Task Analyzability

Information Processing	Task Variety
Amount	.45*
Equivocality	–.01

*$p < .05$

In order to identify the separate relationship of each work-unit task dimension with information processing, partial correlation was used. The partial correlations between the task variety and information variables are shown in Table 3. The data indicate, first, that there was a positive relationship between perceived task variety and perceived amount of information processed by participants ($r = .45$). This is consistent with hypothesis 1 and the argument that unanticipated events are associated with greater information requirements (Galbraith, 1973; Tushman, 1979). Table 3 also shows that variety had a negligible relationship with the equivocality of the information processed in the work units. Whether the information that participants said they use is ambiguous or unambiguous had little to do with the variety and frequency of perceived problems.

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[1] Actually, Perrow hypothesized a positive relationship between the two dimensions. The observed correlation is negative because task analyzability is operationalized in the reverse direction.

Table 4

Partial Correlations Between Task Analyzability and Information Characteristics, Controlling for Task Variety

Information Processing	Task Analyzability
Equivocality	–.46*
Amount	.61**

*$p < .05$, **$p < .01$

Table 4 shows the findings for the analyzability dimension of work-unit activities. The first coefficient supports the relationship in hypothesis 2, that reported information equivocality will be greater when activities are less analyzable ($r = -.46$). Employees indicated that they used information that reflected their tasks. Precise, unequivocal information was reported more often for analyzable tasks; equivocal information was reported more often for tasks that were poorly defined and intangible. As Weick (1969) suggested, information may tend to match the degree of equivocality in the process to which the information applies.

The second coefficient in Table 4 indicates a relationship between task analyzability and information amount ($r = .61$). This finding was not hypothesized and was something of a surprise. Participants in work units characterized by analyzable technologies reported, on the average, that they process more information than participants in work units characterized by unanalyzable technologies. This is somewhat puzzling because participants might be expected to process greater amounts of data to clarify less well-defined situations.

Additional Finding

When this study began, the possibility that the amount and the equivocality of information processing might be related to one another had not been considered. The simple correlation in Table 2, however, indicated a negative relationship between reported information amount and information equivocality ($r = -.48$). This puzzling relationship persisted even when both dimensions of technology were controlled (partial $r = -.37$). Apparently, the perceived amount of information processed in work units was less when information was equivocal, almost as if equivocality substituted for the amount of information in some fashion.

DISCUSSION

The findings provide modest support for the original model. In general, greater task variety in Perrow's technology grid was associated with greater reported amounts of information-processing activity. Greater task analyzability was associated with the reported processing of equivocal information.

The findings also indicated that the relationship between work-unit tasks and perceived information processing was more complex than originally hypothesized. Two unexpected findings represent puzzlements of sorts. Why was a greater amount of information processing reported when work-unit tasks were analyzable, indicating that less data were needed when tasks were poorly understood? When conversion processes are analyzable, they can be broken down into their component parts and the body of knowledge built up to handle problems that arise. A relatively large data base, which reflects the body of knowledge and techniques, can serve these activities. A standard costing system for a manufacturing department or a computer data base for engineering relationships are examples. Participants may depend upon these data sources for information about task requirements or for coordination with other work units. By contrast, when tasks are not analyzable, coding schemes to transmit data and information are hard to develop and use. Communication is thus less frequent when activities are intangible and ambiguous.

The data also indicated that information equivocality was negatively related to information amount. One possible interpretation of this finding is that ambiguous information cues may convey more meaning than concise cues (Daft and Wiginton, 1979). Equivocal forms of information may be richer in content and may absorb more uncertainty for participants if participants have sufficient experience to interpret the information cues. This may mean that participants can use different information-processing modes to deal with task uncertainty. They may attend to large amounts of unequivocal data if the situation warrants or use a smaller number of equivocal cues as necessary to interpret task requirements. The use of fewer equivocal cues may come about in some settings because organizations increase their tolerance for ambiguity by evolving symbol systems that capture and communicate information about the work environment (March and Simon, 1958). Condensing greater information into a symbol adds to the symbol's equivocality because the richer meaning is subject to varying interpretations (e.g., words may typically convey richer information than numbers but may also have several shades of meaning). These cues convey abundant information because the participants' internal representations are based on experience with the symbols, and they know how the symbols correspond to antecedents in the work situation. Top manager preference for soft information (Mintzberg, 1973) is an example. Relatively few information cues are needed when they are highly informative for participants.

IMPLICATIONS

Theory

The purpose of the research reported here was to conduct an exploratory field study of relationships between work-unit task activities and information processing. The empirical findings have to be treated as extremely tentative because of limitations inherent in the research. Information-processing behavior was not actually observed. The findings were based on perceptual data from new questionnaire scales and a survey of 24 work units. Furthermore, variables other than task characteristics that may affect information processing were not included in the study.

Within these limitations, the data imply a possible new perspective on information processing in organizations. In the organization theory literature, information processing and task uncertainty are expected to have a close, direct relationship. As uncertainty increases, the amount of information processing is expected to increase. The two task dimensions examined in this study represent two types of task uncertainty for organization participants. Task variety represents uncertainty about the occurrence of problems and exceptions. The finding for uncertainty about problem occurrence (variety) is entirely consistent with earlier theory and research. When uncertainty about problems was high, large amounts of information processing were reported.

Uncertainty about cause-effect processes (analyzability), however, had the *opposite* relationship with information amount. Greater uncertainty was associated with smaller amounts of perceived information processing. One reason for this finding probably is that coding schemes are difficult to develop and information is difficult to share when activities are intangible and poorly understood. Participants may shift to an alternative mode of processing when information is "impacted" and cannot be easily shared among participants (Williamson, 1975). Thus, the reported amount of information-processing activity was less, not more, under this type of uncertainty.

Disaggregating task uncertainty into two dimensions thus revealed a possible new relationship between task uncertainty and information processing. More information processing was reported when there were many problems but also when processes were sufficiently analyzable that information could be developed and shared among participants.

Application

Another interpretation of the findings — going beyond the data — concerns the information sources and the information-gathering behavior of work-unit participants. The observed results about information processing provide clues for predicting certain kinds of information sources and behavior depending on work-unit tasks.

In high-variety work units, participants might be expected to spend a larger percentage of their time gathering or exchanging data to deal with the frequent exceptions that arise. By obtaining additional data, participants may develop sufficient understanding to respond to problems in an effective manner. The information-processing activity could take various forms, such as attending meetings, talking on the telephone, or interacting with a computer data base. Generally, then, as task variety increases, activity may be directed toward information processing and perhaps away from direct production activities.

The findings about information equivocality suggest something about the form of information that participants may process. The notion of equivocality reflects a qualitative rather than a quantitative dimension of information. Participants in highly analyzable settings may be able to rely more on quantitative forms of data, whereas qualitative data may be more appropriate in less analyzable situations. Data sources might be placed along a rough continuum from equivocal to unequivocal, beginning with face-to-face; then written; then perhaps mechanistic sources such as rules, procedures or formalized information systems; and finally quantitative data, such as those contained in computer printouts. If the observed patterns of information processing are correct, the less equivocal, standardized data sources may be used more often in work units with analyzable tasks, and equivocal sources may be used in less analyzable settings. Analyzability of task requirements thus may be a useful predictor of the form that information processing takes in various work units.

The remaining relationship concerns the level amount of reported information processing for tasks of high analyzability. When activities are clear and explicit, coding schemes can be developed to communicate about these activities. But in less well-defined settings, where less codified information is available, where do participants obtain knowledge for effective responses to problems that arise? One source might be a relatively small number of equivocal cues that may convey insight to participants. Another possibility is that participants may turn inward to past experience rather than outward to external data. Participants may build up internal representations of their work environment from sources such as trial and error, observing others, or simple practice and repetition. Thus the absence of external data-processing activity may not mean the absence of knowledge for work performance. Experience may substitute for external data in poorly defined tasks.

Analyzability	Low	High
Unanalyzable	**Craft Technology** Information Processing: Amount = Low Equivocality = High Small amounts of qualitative information — past work experience and observation, occasional face-to-face and group exchanges.	**Nonroutine Technology** Information Processing: Amount = Moderate Equivocality = High Moderate to large amounts of primarily qualitative information — frequent face-to-face and group exchanges, unscheduled meetings, also trial and error experience.
Analyzable	**Routine Technology** Information Processing: Amount = Moderate Equivocality = Low Moderate amounts of clear, often quantitative information — written reports, rules and procedures, schedules, some statistical data reports.	**Engineering Technology** Information Processing: Amount = High Equivocality = Low Large amounts of primarily quantitative information — large computer data bases, written and technical materials, frequent statistical reports.

Variety

Figure 3. Revised model of information processing.

The ideas about possible information sources are summarized in Figure 3. These ideas are speculative and should be considered as a set of tentative hypotheses that must be developed and tested in future research. One implication of Figure 3 is that information sources may not easily be substituted for one another because of special needs for equivocality. Galbraith (1973, 1977), for example, suggested using computer information processing when the hierarchy becomes overloaded and managers are not able to process sufficient information in a face-to-face manner. To the extent that managers deal with problems that are unanalyzable, computer processing would not solve the information problem because computers deal with unequivocal, standardized information. Computer processing would remove equivocality that managers may need to interpret the work situation. Other mechanisms, such as adding more personnel or restructuring the hierarchy, would be more likely to provide information with adequate equivocality.

The information sources in Figure 3 are partly conjecture because specific information forms were not observed in this study. The suggested sources draw on other research, however, and are consistent with our findings. Tushman (1979) reported that oral communication and decentralized information sharing were greater in research projects than in technical service projects. Connolly (1975) also found greater horizontal information sharing in high-uncertainty settings. Van de Ven, Delbecq, and Koenig (1976) found unscheduled meetings (equivocal information) more prevalent in nonroutine activities, whereas rules and plans (less equivocal) were used frequently in routine tasks. Randolph (1978) reported that flexibility of communication media increased with technology uncertainty.

Effective information support systems in organizations should probably reflect the work-unit information requirements described in Figure 3. Precise, technical information and computer data bases may be appropriate in engineering-type settings. But large data bases may provide more data volume than needed for low-variety activities and less equivocality than needed for tasks in less analyzable work units. Face-to-face exchanges may be important in less analyzable settings, and some tasks, such as craft activities, may require substantial work experience in place of external data in order for participants to know how to respond when problems arise.

Providing inappropriate information sources to participants in work units, such as developing a computer data base for poorly defined activities, could lead to decision errors within the organization. Case examples suggest that information effectiveness reflects a fit with task and systems needs (Ackoff, 1967; Daft and Macintosh, 1978). Systematic research has been undertaken (Galbraith, 1977; Tushman and Nadler, 1978; Tushman, 1979), but additional research is needed to understand better the practical implication of "fit" between information sources and information needs. The study reported here has barely begun to explore the complex issues surrounding information processing in organizations. A great deal of additional research is necessary to increase our understanding of human organizations as information-processing systems.

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Nursing Subunit Technology: A Replication

Peggy Leatt and Rodney Schneck

Overton, Schneck, and Hazlett's (1977) measurement of nursing subunit technology was replicated using 157 subunits of 9 types located in 24 hospitals in Alberta. A 21-item questionnaire was given to nurses, and the answers were subjected to factor analyses. Results indicated three dimensions of technology: instability, uncertainty, and variability. Because of the similarity of these variables to those in the Overton, Schneck, and Hazlett study, the results suggested a high degree of construct validity for the measure. The technological dimensions also differentiated among the types of subunits in the same pattern as in the original study. A relatively quick method of obtaining measures of instability, uncertainty, and variability by using composite scores was tested and found reliable.•

Since the work of Woodward (1965) and Perrow (1967), the technology of an organization has been theoretically viewed as a major determinant of structure and other organizational characteristics. Studies of human service organizations have attempted to evaluate Perrow's (1976) conceptual framework; Hage and Aiken (1969), Grimes, Klein, and Shull (1972), Lynch (1974), Van de Ven and Delbecq (1974), and Comstock and Scott (1977) have generally confirmed that technology significantly affects organizational behavior.

The empirical research to date has indicated that measurements of technology, even those that rely exclusively on Perrow's construct (1967) may be operationalized in several different ways depending on the type of organization, the level of analysis, and the individual preferences of researchers. The literature demonstrates a variety of measures of technology. For example, Lynch (1974) developed a general measure of technology which she tested on libraries. Kovner (1966), Comstock and Scott (1977), and Overton, Schneck, and Hazlett (1977) explored the measurement of technology in nursing subunits. Most of the measures appear to have been developed using one specific sample and there has been little attempt to replicate measurements using different samples or to determine a measure's reliability and validity in subsequent research.

The importance of replication for organizational studies appears in the recent evaluation by Dewar, Whetten, and Boje (1980) of the technological and structural scales designed by Hage and Aiken. This importance is shown also by Child's (1972) replications of the Aston group's measurement of structure, and by the replications of Lawrence and Lorsch's measurement of environment (Tosi, Aldag, and Storey, 1973; Downey, Hellriegel, and Slocum 1975). Similarly, a replication of the measurement of technology should reveal the reliability and validity of the measure and add precision to the operationalization of this important organizational construct.

This paper reports an attempt to replicate a previous measurement of technology and to test the measure's reliability and validity. Cronbach and Meehl (1955) suggested some criteria for testing a measure. They defined a measure's "construct validity" as agreement between hypothesized dimensions and empirical findings. One criterion of construct validity is the measure's "discriminability," the degree to which the measure discriminates among groups or subunits suspected a priori of

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having different measurement values (Cronbach and Meehl, 1955). A second criterion described by Cronbach and Meehl (1955) is the degree to which different measurements (using the same measure) correlate more highly with each other than they do with measurements using a different measure (see also Campbell and Fiske, 1959). This type of convergence resembles "criterion-oriented validity," the extent to which one measure predicts another criterion; when the prediction is simultaneous with the measurement, criterion-oriented validity is called "concurrent" validity (Cronbach and Meehl, 1955). Another criterion, "reliability," requires consistency or internal homogeneity among items that are meant to measure the same technological dimension (Kerlinger, 1973).

These criteria were used in a replicated study to test the construct validity and the reliability of Overton, Schneck, and Hazlett's (1977) measure of the technology of nursing subunits in hospitals.

BACKGROUND

The technological construct operationalized by Overton, Schneck, and Hazlett (1977:204) was based primarily on the theoretical work of Perrow (1967). The construct had three dimensions: (1) raw materials and their uncertainty, instability, and variability (Perrow, 1967); (2) techniques used in transforming raw materials (Perrow, 1967); and (3) task interdependence (Van de Ven, Delbecq, and Koenig, 1976). In Overton, Schneck, and Hazlett's (1977) study, the raw materials of nursing subunits were the patients, the technique was the nursing care, and task interdependence was the extent to which nurses were required to work together as a team. A 34-item questionnaire was developed in which eight items measured the patients' characteristics, 18 items related to the nature of nursing care, and 6 items measured task interdependence. Nurses responded to a five-category Likert-type scale. Data were obtained in 1975 from 71 nursing subunits of seven different types located in four hospitals in Alberta, Canada. The questionnaire was given to a sample of nurses, stratified by level of education, from each subunit. Subunit scores for each item were obtained by averaging the responses within each subunit. Factor analysis was used on the subunit scores to identify the underlying technological dimensions; with varimax rotation this resulted in a three-factor orthogonal solution which explained 61 percent of the variance in 28 items. The three factors were interpreted as uncertainty, instability, and variability.

According to Overton, Schneck, and Hazlett (1977) these three empirically derived dimensions of technology were more general than those they had initially hypothesized. They concluded that their measure of technology was reasonably valid because the factor scores for uncertainty, instability, and variability discriminated among the seven types of nursing subunits. Cluster analysis, using *Q* technique, also verified that the total technological measure was able to identify subunit clusters by the indeterminancy of their technology. "Indeterminancy" in technology, a term used by Overton, Schneck, and Hazlett (1977), referred to a combination of uncertainty, instability, and variability.

METHOD

Definition of the Technology of Nursing Subunits

In this replication, as in the previous study, technology was defined as the actions an individual performs upon raw materials, with or without the aid of tools, to bring about change or modification (Perrow, 1967). Based on the results of Overton, Schneck, and Hazlett (1977) three technological dimensions were specified: (1) uncertainty; (2) instability; and (3) variability. "Uncertainty" was defined as the degree to which there was insufficient knowledge about both the raw materials and the probability of achieving intended outcomes through application of the techniques.[1] Operationally, uncertainty was measured by the number of patients who had more than one diagnosis and the number who presented complex nursing problems, and also by the extent to which complex nursing techniques relied upon both intuition of nurses and feedback from patients. "Instability" was defined in terms of the unpredictable fluctuations in raw materials and techniques. Instability was measured by the number of patients who (1) required frequent nursing observation and attendance, (2) required highly specialized technical monitoring, and/or (3) who might require emergency procedures. "Variability" was the amount of variation in the raw materials and in the techniques; this was measured by the variety of health problems presented by patients and the degree of variation in nursing techniques. Uncertainty focussed on unpredictability due to lack of knowledge; instability emphasized unpredictability arising from changes in each patient's condition and variability referred to unpredictability arising from variations among patients and their nursing care needs. Uncertainty, instability, and variability were hypothesized to be independent.

Research Instruments

A questionnaire comprising 21 items taken from Overton, Schneck, and Hazlett's (1977) questionnaire was used to obtain individual nurses' perceptions of subunit technology. Thirteen items in the original questionnaire were not included because they had not contributed to identifying the dimensions of technology in factor analysis (Overton, Schneck, and Hazlett, 1977). Furthermore, some of these 13 items appeared to lack face validity, and their wording was sometimes unclear. In the replication, ten items were selected to measure uncertainty, eight measured instability, and three variability. These items had factor loadings of greater than .6 in Overton, Schneck, and Hazlett's study (1977). The wording of the selected questions, the range of possible responses, and the scoring of responses were the same as in the original research.

A second measure of instability was developed to test the concurrent validity of Overton, Schneck, and Hazlett's (1977) measure. This second measure was a checklist of specialized and technical equipment that was given to the headnurse of each subunit. The headnurse was asked to indicate which types of equipment were regularly used on her subunit. The researchers scored each piece of equipment according to its complexity, using a scale of 1 to 4. "Complexity" referred to the complexity inherent in the equipment itself rather than to any effect the equipment might have upon the subunit work. A score of 4 was given to highly complex equipment: heart monitors and ventilators, and equipment for dialysis, suction, and continuous oxygen. A score of 3 was assigned to items such as intravenous and special physiotherapy equipment, prosthetic appliances, and body lifts and frames. Medication equipment and portable oxygen equipment received a score of 2, and noncomplex equipment such as wheelchairs, restraints, walkers, and crutches received a score of 1. The research instruments are shown in the Appendix.

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[1] We are grateful to an anonymous reviewer for helping clarify this definition.

Sample

Analysis was of the nursing subunit, which was defined as an inpatient area of a hospital that has an assigned number of beds, a regular complement of both professional and other nurses, an identifiable goal, a formal structure, and arrangements for nursing tasks (Overton, Schneck, and Hazlett, 1977). The seven types of subunits included in the original study were obstetrical (OBS), pediatric (PEDS), surgical (SURG), psychiatric (PSYCH), auxiliary (AUX), rehabilitation (REHAB), and intensive care (ICU). Two types of subunits, rural (RURAL) and medical (MED), were added to the replication in an attempt to test the ability of the measure to generalize across types of subunits.

The subunits were located in 24 hospitals that varied in kind, size, and ownership. All hospitals were in Alberta, Canada. Subunits within hospitals were included if they met a priori definitions of each type. The sample size was 157: 26 MED, 34 SURG, 13 ICU, 14 REHAB, 10 AUX, 20 PEDS, 15 PSYCH, 14 OBS, and 11 RURAL. Data collection took place in the summer, 1977.

All nurses on duty (day, evening, and night shifts) during given data collection days completed the technology questionnaire. This sample, an average of 40 percent of the total staff of each subunit, was stratified by education levels according to the education level of the total nursing staff. The mean number of participating nurses per subunit was eight; 1,265 nurses completed the technology questionnaire.

Analyses

Subunit scores were obtained for each questionnaire item by calculating the mean of nurses' responses within each subunit. These subunit scores were then analyzed.

Technological dimensions. The underlying technological dimensions within the measure of technology were identified by factor analyses. These analyses included orthogonal analysis with varimax rotation, which Overton, Schneck, and Hazlett (1977) found to provide the best solution. Oblique rotation was also applied. Three items (18, 19, and 20) were eliminated because they had low commonalities and did not load highly on any factor.

Concurrent validity. Concurrent validity of the measure was assessed with Pearson correlation coefficients of standardized factor scores with the independent measure of technical and specialized equipment. The factor scores of instability, uncertainty, and variability had means of zero and standard deviations of one.

Discriminant validity. Analysis of variance was used on the mean factor scores from the nine types of subunits. All possible pairs of means were compared with a multiple range test using the Newman-Keuls procedure.

Comparisons with results of Overton, Schneck, and Hazlett (1977). Subunit factor scores were transformed so as to have means of 25 and standard deviations of 5. The transformed scores could be compared directly with the results of Overton, Schneck and Hazlett (1977).

Composite scores. Composite scores for instability, uncertainty, and variability were calculated with Alwin's (1973) method. The composite scores of each factor equalled the sum of subunit responses to all items that had high loadings on that factor. The composite score of instability was the sum of responses to items 1, 5, 6, 7, 8, 9, 16, and 21; uncertainty, items 3, 4, 10, 11, 12, 13, and 17; and variability, items 2, 14, and 15. Alpha coefficients, which measure internal homogeneity, were .903, .820, and .817 for these three sets of items, respectively.

RESULTS

Technological Dimensions

Although in Overton, Schneck, and Hazlett's (1977) study, the best result was found using orthogonal analysis with varimax rotation, the most interpretable result in the replication was a three-factor solution with oblique rotation (Table 1). The factor solution accounted for 66.5 percent of the variance in subunit responses. The solution shown in Table 1 accounted for more variance than other solutions and provided a clearer interpreta-

Table 1

Technology — Oblique Factor Structure Solution

			Factors*	
Item	Content	1 Instability	2 Uncertainty	3 Variability
3	Detailed history	.295	.582	–.099
4	Patients with complex problems	.311	.615	.125
11	Goals for care planning	–.211	.511	.246
12	Socio-psychological needs	–.166	.742	.115
13	Techniques, intuitive	.237	.802	.034
17	Feedback from patients' conditions	.494	.660	.016
9	Techniques helpful to patients	.596	.564	.057
10	Techniques for complex problems	.592	.781	.081
16	Techniques difficult to learn	.573	.362	–.179
1	Patients' instabilities	.691	.406	–.159
5	Skill, technical	.776	.158	–.037
6	Technical equipment	.881	.148	–.154
7	Intravenous infusions	.789	–.052	–.097
8	Nurses pressed for time	.914	.181	–.155
21	Frequency of emergencies	.751	.269	–.024
2	Patients' variabilities	–.240	–.091	.824
14	Techniques, variable	–.134	.110	.928
15	Techniques, nonrepetitive	.118	.199	.645

*Loadings of .50 and greater are underlined.

tion. The oblique rotation allowed for the possibility, later confirmed, that the factors might be correlated.

Instability. The technological dimension inherent in Factor 1 concerned instability in the work. Items loading highly on this factor were related to unpredictable changes in patients' conditions, reflected by their requiring frequent nursing observation (item 1), many tests (item 5), and technical equipment (items 6 and 7). Problems related to time pressure (item 8), the frequency of emergencies (item 21), and difficulty in learning the speciality (item 16) also loaded highly.

Uncertainty. Factor 2 concerned the uncertainty in nursing care due to the complexity of patients' problems and treatments (items 4 and 10), the social-psychological nature of nursing care (item 12), and the changes in tasks in response to changes in the patients' conditions and moods (item 17). Also, uncertainty was reflected by the nurses' need for detailed health histories (item 3) and written goals for patient care (item 11), and by the nurses' use of intuition in solving problems (item 13).

Both the instability and uncertainty factors related to nursing tasks that depended on a nurse's skill, initiative, and ability to solve complex problems. This was reflected by high loadings on both factors by items 9 and 10.

Variability. The third factor concerned technological variability. Items 2, 14, and 15, which loaded highly, related to the variety in patients' problems (item 2), nursing care (item 14), and nurses' decisions (item 15).

Construct Validity

The results were generally the same as those in the original study. Some differences, however, were found, which may have been due to the reduction in the number of items used in the replication. First, in the replication, instability emerged as the first and largest factor, while uncertainty was the first and largest factor in the original study. Second, although items 11 and 12, concerned with the social-psychological aspects of patient care and written goals for patient care, loaded highly positive on uncertainty in the replication, they loaded highly negative on instability in the previous research. This change seemed reasonable because, in general, social-psychological aspects of nursing care are not well understood and are, therefore, uncertain. Also, there is a tendency for a greater number of goals to be specified when patients present complex social-psychological problems. Third, item 16, relating to the difficulty in learning the speciality, was associated with instability in this study but with uncertainty in the previous one. Fourth, three items (18, 19, and 20) were not as informative in this study as they appeared to be in Overton, Schneck, and Hazlett (1977). These items seem to lack face validity as measures of technology in that they refer primarily to role relationships of nurses with physicians and with other nurses. Fifth, although Overton, Schneck, and Hazlett (1977) had found the technological factors to be orthogonal, this research showed that factors 1 and 2 were related ($p < .01$). A Pearson correlation coefficient of .252 was found between the uncertainty and instability factors.

Nevertheless, this three-factor solution was essentially very similar to the three-factor solution produced by Overton, Schneck, and Hazlett (1977) and also reflected the underlying technological constructs hypothesized by Perrow (1967). These findings indicated considerable construct validity for the measure of nursing subunit technology.

Concurrent Validity

It was expected that the independent measure of technical and specialized equipment would correlate highly with instability but not with uncertainty or variability because of the independent measure's focus on the use of specialized equipment. These expectations were confirmed. The correlation coefficient between technological complexity and instability was .41 ($p < .01$), but technological complexity was not significantly ($p =$ .05) correlated with uncertainty or variability. These findings provided some evidence for the convergent validity of the measure of technology.

Discriminant Validity

On the basis of the results of Overton, Schneck, and Hazlett (1977), it was anticipated that the three dimensions of technology would differentiate among the various types of nursing subunits. The nine types of subunits were found to differ in instability, uncertainty, and variability (Table 2), and the types of subunits grouped differently along each technological dimension. The types of subunits formed three groups with respect to instability. Intensive care subunits were significantly ($p = .05$) greater in instability than all other subunits. Rehabilitation, auxiliary, and rural subunits were lowest in instability; and psychiatric, pediatric, obstetrical, surgical, and medical subunits were intermediate (Table 3).

Table 2

Analysis of Variance on Factor Scores

	D.F.	Sum of Squares	Mean Score	*F* Ratio
1. Instability				
Groups	8	90.828	11.354	29.721*
Error	147	56.155	0.382	
2. Uncertainty				
Groups	8	77.964	9.746	22.861*
Error	147	62.664	0.426	
3. Variability				
Groups	8	43.576	5.447	8.235*
Error	147	97.229	0.661	

*$p < .05$

The psychiatric subunits were significantly higher in uncertainty than were all the other types of subunits. Intensive care, rehabilitation, pediatric, medical, and auxiliary subunits appeared intermediate. Obstetrical, surgical, and rural subunits were lowest in uncertainty.

When variability was examined, the types of subunits did not differentiate into concise categories. Four groups were found, and some types of subunits occurred in more than one group. Obstetrics, intensive care, and auxiliary subunits seemed to have relatively low technological variability, and medical, pediatric, psychiatric, rehabilitation, rural, and surgical subunits appeared to have slightly greater variability. No clear conclusions could be drawn, however.

Table 3

Pairwise Comparisons of Ordered Means

Factor 1: Instability							
Low	REHAB	AUX	RURAL	PSYCH	PEDS	OBS	
	−.766	−.734	−.580	−.400	−.251	−.139	
	PSYCH	PEDS	OBS	SURG	MED		
	−.400	−.251	−.139	.110	.150		
High	ICU						
	2.298						
Factor 2: Uncertainty							
Low	OBS	SURG	RURAL	AUX	MED	PEDS	REHAB
	−.654	−.544	−.461	−.136	−.106	−.014	.001
	AUX	MED	PEDS	REHAB	ICU		
	−.136	−.106	−.014	.001	.609		
High	PSYCH						
	1.908						
Factor 3: Variability							
Low	OBS	ICU	AUX				
	−1.309	−.644	−.614				
	ICU	AUX	SURG	RURAL			
	−.644	−.614	.137	.207			
	AUX	SURG	RURAL	REHAB	PSYCH		
	−.614	.137	.207	.239	.304		
High	SURG	RURAL	REHAB	PSYCH	PEDS	MED	
	.137	.207	.239	.304	.386	.401	

Note: Subunits on same line indicate the differences were not significant ($p < .05$) in multiple range tests using Newman-Keuls Procedure.

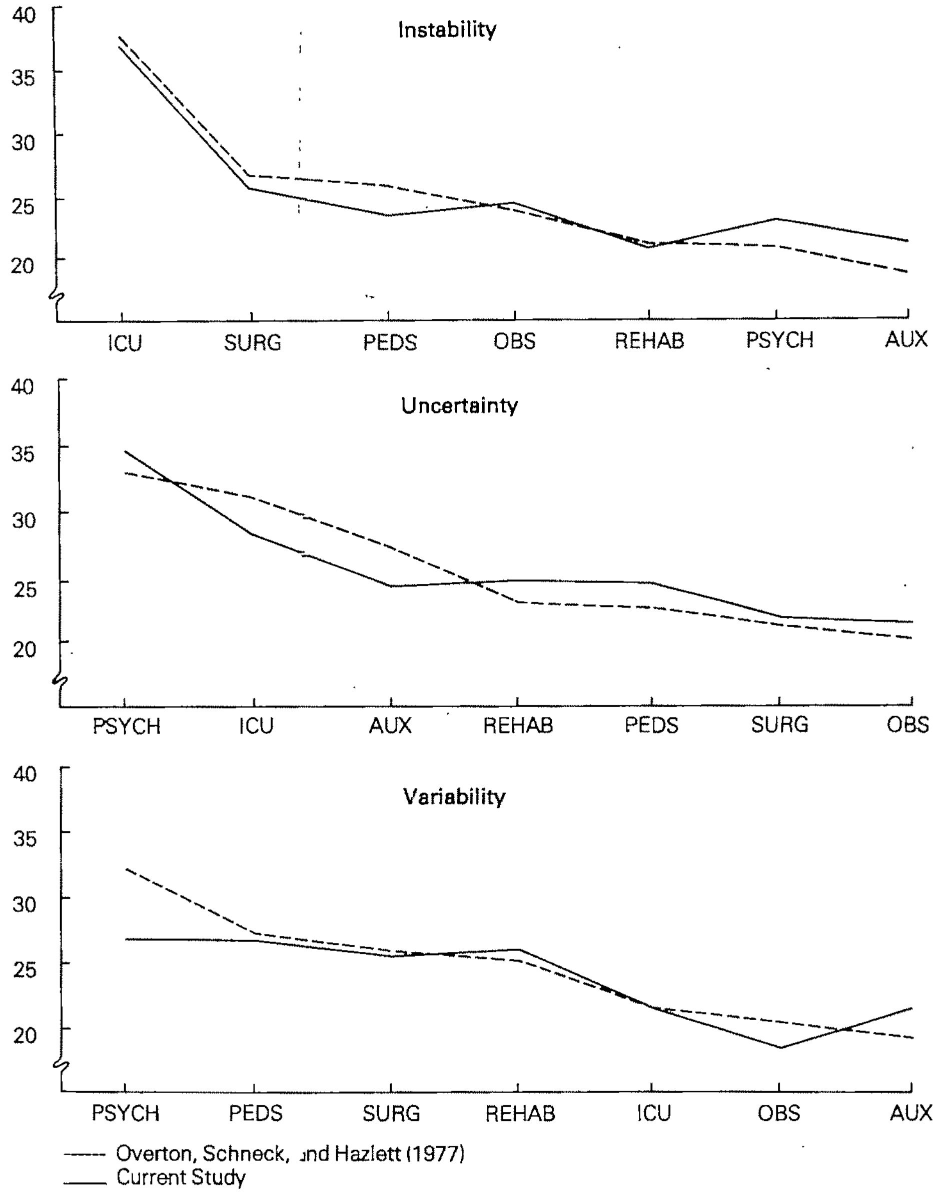
These results suggested that instability and uncertainty were generally better discriminators among types of nursing subunits than was variability. Overton, Schneck, and Hazlett (1977) obtained similar results, although they found clearer differences among the types of nursing subunits in all three factors. The fewer significant differences found in the current study may have been due to the inclusion of the two extra types of nursing subunits, medical and rural, and their similarities with other types of subunits.

Comparisons with Results of Overton, Schneck, and Hazlett (1977)

The mean factor score (ordered by rank) of types of subunits from both studies are shown in the figure.

With respect to instability, the ranking of the types of subunits in this research was similar to that found by Overton, Schneck, and Hazlett (1977). The similarity is indicated by the extent to which the curves in the figure are parallel. Furthermore, in both studies the standardized mean for each type of subunit was similar. For example, intensive care units scored highest in instability in both studies (35.73 in the Overton, Schneck, and Hazlett [1977] research; 36.49 in the current research). The main differences were that surgical and pediatric subunits appeared slightly lower in instability in the present study, and psychiatric and auxiliary subunits were slightly higher.

Figure. Mean factor scores (ordered by rank) of types of subunits for Overton, Schneck, and Hazlett (1977) and current study.



Note: Factor scores in both studies were standardized (means of 25 and standard deviations of 5).

The ranking and mean subunit scores of uncertainty were also similar in both studies. Intensive care and auxiliary subunit scores, however, were somewhat lower in the present study than in Overton, Schneck, and Hazlett (1977), and rehabilitation and pediatric subunit scores were slightly higher.

The measurements of variability were generally in keeping with those of Overton, Schneck, and Hazlett (1977), with the exception of the psychiatric subunits. These subunits scored 32.902 in the original study, but 26.52 in this study.

Overall, the ranking and mean scores were similar in the two studies. The similarities, which existed despite the inclusion of two other types of nursing subunits, provide evidence for the generalizability of both the measure and the results to other populations of nursing subunits.

Composite Scores

The Pearson correlation coefficient between the composite score and the associated factor score for each dimension of technology was at least .97. Evidently, reliable and valid measures of nursing subunit technology could be obtained more simply by totaling subunits' responses to items measuring the same technological dimension, rather than by obtaining factor scores.

SUMMARY

Our replication indicated that the technological measure used in the original study is generally reliable and valid. Considerable evidence was provided for the utility of a measure with three dimensions: instability, uncertainty, and variability. Like Overton, Schneck, and Hazlett (1977), we conclude that these empirically-derived dimensions support Perrow's (1967) suggestion of the existence of technological frameworks for human service organizations. The predictive validity of the measure was shown by the correlation of the measure of instability with an independent measure of this dimension. The three dimensions discriminated among different types of nursing subunits in a pattern similar to that observed in the original research; this suggests generalizability of the results. The findings differed, however, from those of Overton, Schneck, and Hazlett (1977) in that instability and uncertainty were found to be related.

A reliable method — summing selected responses to build composite scores — allows quick and economical calculation of technological instability, uncertainty, and variability. Such methods should facilitate the examination of relationships among technology, organizational structure, and human behavior in hospital subunits and thereby help advance the empirical understanding of organizations in general.

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APPENDIX: Research Instruments

A. Measurement of Technology

Source: Nurses within each subunit

Method: Questionnaire

Instructions: Beside each of the statements listed below, please indicate by checking (✓) the answer which most closely represents your opinion. In all questions you are asked to estimate a percentage (0 – 5%, 6 – 25%, 26 – 50%, 51 – 75%, or 76 – 100%).

NOTE: The items have been rearranged here for easy reference. Low percentage scores 1.

Uncertainty

3. For some patients more than others it is important to know complete details of their previous health history. For what percentage of the patients on your unit is it critical that the nurse know a detailed history from birth to present time?

4. What percentage of the patients on your unit have complex problems that are not well understood?

9. What percentage of the time does improvement in patients' conditions really have to depend upon the skillful work and initiative of nursing personnel?

10. What percentage of your work requires the analysis of complex problems?

11. What percentage of the patients have written goals for their individualized care in the Kardex (nursing care plan)?

12. What percentage of the nursing care on your unit is directed at meeting patients' socio-psychological needs (as opposed to physical needs)?

13. What percentage of the nursing care given relies upon nurses' intuition rather than on set procedures or routines?

16. What percentage of new nurses starting work on your unit would find the nursing care speciality difficult to learn?

17. What percentage of your work changes in direct response to changes in patients' conditions or moods?

18. What percentage of the time are you highly dependent upon other nurses on your unit for help and/or are they dependent upon your help?

Instability

1. In your estimation, what percentage of patients on your unit need nursing observation more often than once every half hour?

5. What percentage of the nurses' work involves performing technical procedures and special tests?

6. What percentage of patients require the use of technical equipment (i.e., suctions, cardiac monitors, respirators, etc.)?

7. What percentage of the patients on your unit on an average day require an intravenous infusion?

8. On some units there is greater pressure to give nursing care quickly because of patients' critical conditions. What percentage of the time is there a greater time pressure on your unit?

19. - In your estimation, what percentage of the decisions made by the nursing staff of your unit are made independently from physicians?

Instruction: Beside each of the statements listed below, indicate whether you strongly agree, agree, disagree, or strongly disagree.

Scoring: strongly disagree scores 1.

20. Nurses on your unit have frequent verbal or written communications with medical staff.

21. On this unit, there are many emergencies when immediate nursing action must be taken in response to changes in patients' conditions.

Variability (high percentage scores 1)

Instruction: As for uncertainty questions.

2. What percentage of the patients would you say have similar health problems (or diagnosis)? (high percentage scores 1).

14. What percentage of the nursing care procedures are similar for most of the patients on your unit? (high percentage scores 1).

15. What percentage of the decisions made by nurses during their work are repetitive from one day to the next? (high percentage scores 1).

B. Second Measure of Instability

Source: Headnurse within each subunit

Method: Questionnaire

Instructions: Please indicate the types of equipment which are used regularly for patients on your unit.

Scoring: low complexity scores 1; high complexity scores 4.

107. (4) heart monitors, ventilators
(4) dialysis equipment
(4) suction equipment (e.g., gastric, tracheal, wound)
(2) oxygen equipment, portable
(3) special physiotherapy equipment (e.g., hot wax baths, whirlpool tub)
(3) prosthetic appliances
(3) I.V. (intravenous) equipment
(2) medication equipment (e.g., syringes)
(3) special body lifts
(3) special beds
(3) special body frames
(3) parallel bars
(1) wheelchair, stretcher
(1) walker, canes, crutches
(1) commode
(1) security room
(1) restraints
(1) handrails, ramps

The Effects of Formalization on Professional Involvement: A Compensatory Process Approach

Dennis W. Organ and Charles N. Greene

A persistent theme in discussions of professionals in organizations concerns the alienating effect of formalization. It is traditionally argued that structural formalization arouses conflict between administrative imperatives and professional norms. A case is presented for possible compensatory effects, and thus a more benign view, of formalization. Path analysis of data from 247 engineers and scientists in three organizations supported this notion. The effects of formalization in reducing role ambiguity and in enhancing identification with the organization offset the effect of inducing role conflict: the net effect of formalization was to reduce alienation.

For quite some time now, organizational theorists have pondered the apparent contradiction between two major trends affecting the work environment. On the one hand, the work force in the Western world has developed in the direction of increasing professionalization. On the other hand, as Hall (1968, 1977) noted, work has become increasingly an organizational phenomenon, and the bureaucratic structure has accounted for an increasing proportion of the employment of the labor force.

Although these trends appear to spring logically from an underlying thrust toward an increased rationalization of work, they are viewed by many as somewhat antithetical in their effects on the individual. Kornhauser (1962) compellingly described this antithesis in the case of scientists in industry. He noted the conflict between the professional's desire for autonomy and the bureaucracy's imperative for coordination; the conflict between the professional norm of collegial control and the organizational norm of inevitable hierarchies; the clash between expertise and formal authority; and, ultimately, the split loyalty between the professional association and the employing organization. More recently, Sorensen and Sorensen (1974), studying large accounting firms, found that CPAs with low rank and no tenure tended to have a lower bureaucratic orientation and a stronger professional orientation than could be accommodated by their firms; these professionals were those most likely to report intentions to leave their firms within five years.

Some observers (e.g., Bennis, 1964) foresee the evolution of a new, different form of organization, an Hegelian synthesis of sorts, that will resolve these contradictions. The more pessimistic prevailing view, however, is that one trend or the other (professionalization or bureaucratization) will dominate. Either bureaucratization must be limited to accommodate professionals, or it will tend to alienate the most professionalized (Miller, 1967; Argyris, 1971).

FORMALIZATION AND ALIENATION: TRADITIONAL VIEWS

The implications of this prevailing view hinge on the various interpretations of "alienation" (Kanungo, 1979). Historically, as seen in the writings of Marx and Weber (Gerth and Mills, 1946), alienation is construed as a state in which the job is external to the individual, not a part of his or her nature, a state resulting from the lack of autonomy at work. Dubin (1956) appeared to carry forward this notion of a job-alienated person as one who does not regard the job as a part of the intrinsic nature of one's

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self, but who works only for extrinsic reasons. Seeman (1971) distinguished five components of alienation: powerlessness (lack of control), meaninglessness (resulting from the inability to comprehend the relationship of one's contributions to a larger purpose), normlessness and isolation (resulting when previously approved norms or codes of conduct do not effectively guide behavior toward personal goals), and self-estrangement (experienced on the job when work becomes a path for satisfying merely extrinsic needs rather than a means for expressing one's potential). Kanungo (1979: 24) observed that "many contemporary sociologists believe that self-estrangement is the heart of the alienation concept, as if all other forms of alienation eventually result in self-estrangement."

To say that bureaucratization leads to alienation among professionals, then, seems to suggest that formalization can affect certain conditions so that they culminate in a sense of estrangement, of non-involvement, among professionals. Formalization — the control of job activities by administrative rules and procedures — is presumed to reduce autonomy and to render one's contribution to larger ends less meaningful. Formalization contravenes professional norms of autonomy and control by expertise and collegial influence; it engenders normlessness and isolation by undermining professional standards. These conditions lead ultimately to a self-estrangement in which the professional views the job as preventing the expression of his or her full potential. Therefore, the job becomes external to his or her professional nature, at most an instrumental means for satisfying extrinsic ends. In this "ultimate" sense of self-estrangement, the construct of alienation reflects the opposite of the concept of job-involvement (Lodahl and Kejner, 1965) in the literature of industrial psychology (Kanungo, 1979: 125).

A COMPENSATORY VIEW

One might readily concede that bureaucratization induces a degree of interpersonal conflict among professionals and even that conflict in itself contributes to alienation, although this conflict, like other kinds of conflict, may be resolved to various degrees of satisfaction (e.g., Pondy, 1967). But one need not take the view that formalization has the net effect of producing alienation unless one assumes that it has no offsetting effects. Perhaps formalization produces other outcomes that can reduce alienation, even if it produces unresolved conflict.

Hall (1968) found no statistically significant correlations between dimensions of bureaucratization and most attitudinal dimensions of professionalization (excepting the desire for autonomy). He suggested that "it appears to make little difference [in alienation] if there is extensive reliance upon such a [rigid] hierarchy in professionalized organizations" (Hall, 1968: 102). Indeed, a rigid hierarchy might even facilitate the work of professionals if it improved coordination and communication.

Kornhauser (1962) noted that companies have more trouble clarifying goals and policies for research and development than for any other function. He cited a survey of over 3,500 research professionals who were bothered that they had little contact with management and little knowledge of company goals. This situation would appear to be not a dysfunction of bureaucratization, but rather a condition created by insufficient formalization. More explicit statements of policies, responsibilities, and procedures might have ameliorated the discomfort produced by ambiguity.

Glaser (1963), Miller and Wager (1971), Goldberg (1976), and Greene (1978) have argued that identification by professionals need not be split into "local" and "cosmopolitan" (Gouldner, 1957). Indeed, Goldberg (1976: 352) found that a combination ("cosmopolitan-local") coincides more with the needs of professionals by encouraging them to increase their professional expertise, through closer contacts with their disciplines, and to remain committed to their organization and its clients. Similarly, Glaser's findings suggested that local and cosmopolitan orientations may be fused by combining them with an "institutional motivation," if the professional can comprehend the congruence between the employer's means and the ends of professional endeavor. Both the employer and the professional are concerned with creating and applying knowledge and providing services for the larger social order. Formalization of organizational context may be a prerequisite to the articulation of such a congruence, fostering an identification with the organization and reducing or preventing alienation.

As Engel (1969: 32) noted, "bureaucracies can implement goals of professions and professionals," precisely because of the scale of activity made possible by the bureaucracies. Formalization expedites access to sophisticated technological resources and facilitates collaboration with highly specialized colleagues. Engel (1969) found that physicians associated with a moderately bureaucratic setting (a privately owned, closed-panel organization) reported more autonomy than physicians who worked either in a nonbureaucratic setting (small group practice) or in a highly bureaucratic one (government).

Montagna (1968) studied large accounting firms as examples of the "professional bureaucracy" and found them to be characterized by a high level of centralization and yet rather few administrative personnel. The centralization is made possible by "external rules"; that is, formalization can be fused with professional norms, obviating the need for frequent direct supervision. Montagna concluded that such rules enhanced the autonomy of the professional and thus limited the dysfunctions of bureaucratization.

Formalization also may indirectly affect alienation of professionals via other variables considered to be direct antecedents of alienation. Two such variables are role ambiguity and role conflict (Greene and Organ, 1975). Role ambiguity, or lack of clarity, refers to discrepancies between job-related information available to the person and information needed by the person for adequate job performance (Kahn et al., 1964). Role ambiguity thus seems to result, in part, from insufficient organizational guidelines, that is, from lack of formalization (Rizzo, House, and Lirtzman, 1970; Lyons, 1971). However, while formalization may reduce ambiguity, it increases the probability of role conflict (Kahn et al., 1964), particularly when the missions of organizational units overlap or when discrepancies exist between professional norms and organizational requirements. Both role ambiguity and role conflict have been related to various measures of alienation and have been considered (but not empirically demonstrated) to be antecedents of alienation (e.g., Cohen, 1959; Taves, Corwin, and Haas, 1963; Kahn et al., 1964; Rizzo, House, and Lirtzman, 1970; Ivancevich and Donnelly, 1974).

This paper submits that formalization has the effect of reducing role ambiguity as well as inducing or activating role conflict. Whether formalization has a net positive or negative effect on alienation by its intervening contribution to role conflict, role ambiguity, and identification with the organization is an empirical question that this study seeks to address.

To address this question, we obtained, via a questionnaire, measures of the relevant organizational, perceptual, and psychological variables from a convenience sample of professionals in three firms. We then used path analysis to identify a model that showed the different effects of formalization on alienation and how these effects were mediated.

SAMPLE

The sample consisted of 247 senior scientists and engineers employed in the research, development, and engineering divisions of three firms: a manufacturer of electronics equipment and supplies (94 participants), a paper products firm (68 participants), and an air frame manufacturer (85 participants). Three participants were randomly selected from each project group or section at the paper products firm and the electronics manufacturer. At the air frame manufacturer, scientists were grouped by themselves or integrated with engineers in project groups. Altogether, 89 project groups and sections were sampled. In each of 20 of these units, one questionnaire was either not returned or incorrectly completed.

The R&D divisions in the three firms were very similarly organized; each was decentralized and autonomous relative to other divisions in their companies. These R&D divisions clearly fell into Hall's (1968) "professional" type of organizational base for professional occupations. According to Hall (1968: 94), this is the type that has served as the basis for many discussions of professional-organizational conflict.

MEASURES

Measures were taken of formalization, of alienation, and of the three variables presumed to mediate the effects of formalization on alienation: organizational identification, role conflict, and role ambiguity. Also, organization membership and job orientation of the respondent's work unit were coded so that these sources of variance in the measures above could be taken into account.

Organization

Organization was defined as a nominal or dummy variable, with the paper products firm coded 1, 0, and the air frame manufacturer 0, 1; the electronics equipment firm functioned as the reference group and was coded 0, 0. This coding scheme was suggested by the observation that the air frame manufacturer and the paper products firm scored significantly ($p < .05$) higher in degree of formalization than did the electronics firm. In further analysis, the variable "organization" was used primarily to determine whether membership in the air frame or paper products companies contributed to differences in role ambiguity, role conflict, organizational identification, and alienation because of differences in degree of formalization in the companies.

Job Orientation

Job orientation was categorized as engineering, applied research, or basic research. The job orientation of a sampling unit was derived from written job descriptions and evaluations (which defined variety and degree of difficulty of work and amount of supervisory assistance typically required), information obtained from company officials, and company descriptions of the activities of the various units involved. Interest was focused on the direct and indirect effects of formalization, but we hoped also to account for variation in formalization itself. As indicated above, the variable "organization" accounted for some of the variance in formalization. Other sources of variation exist; Thompson (1967), Ouchi and Maguire (1975), and others point to task/technology type as a major determinant of structural attributes such as formalization. Tasks that afford no clear basis for specifying either desired outcomes or means for reaching outcomes tend to inhibit formalization; those that lend themselves both to a priori identifiable goals and to specifiable cause-effect paths tend to evoke formalization.

A conservative approach might dictate the coding of job orientation in nominal form. However, it was felt that a rationale existed for coding job orientation in ordinal form. Engineering seemed to be the most "programmable" of the task types in the sense that engineering activities are more likely to have predesigned objectives and schedules that allow workers to proceed according to specifiable means toward some end. Applied research, while directed toward some defined goals, offers a less certain basis for directing activity toward such goals. Basic research is more likely to resist the formulation of either unambiguous objectives or behavioral specifications. Thus, an ordinal scaling of job orientation (engineering = 1, applied research = 2, basic research = 3) was conceived.

Formalization

The eight-item "formalization" factor from House and Rizzo's (1972) Organizational Practices Questionnaire was used to assess the extent to which standard practices, policies, and position responsibilities have been explicitly formalized by the organization. House and Rizzo reported reliability (split-half) coefficients of .83 and .80 for two different samples. In the present study, the split-half reliability coefficient (computed with the Spearman-Brown formula) was .76, and the item analysis yielded a Guttman scale with a coefficient of reproducibility (Goodenough technique) of .87, a minimum marginal reproducibility of .67, and a coefficient of stability of .65. The formalization instrument was administered to three of the subjects' peers (but not to the subjects themselves) in each department, section, or project group. The purpose of the independent self-reports was to reduce the problem of spurious correlation due to same source data. The results were validated by means of interview data collected from company officials concerning structural criteria proposed by Evan (1963).

The formalization measure captures some, but clearly not all, of the components of bureaucratization identified by Hall (1968). It does not, for example, explicitly measure "hierarchy of authority" or "impersonality." While Hall (1968) found rather high correlations between some of these components (for example, the "hierarchy" measure correlated .82 with "Rules" and .74 with "Procedures"), he concluded that different aspects of bureaucratization might have qualitatively different effects on professionals. Thus, this paper's analysis and conclusions focus on formalization as opposed to the larger construct of bureaucratization.

Role Conflict and Role Ambiguity

Two shortened versions (10 items each) of the longer scales developed by Rizzo, House, and Lirtzman (1970) were utilized to measure role conflict and role ambiguity. These measures were based on the research by Kahn et al. (1964). The measure of role conflict emphasized incompatibilities or incongruities that arise out of perceptions of performance or role requirements, and the measure of role ambiguity stressed lack of clarity in behavioral requirements. Kahn et al. (1964) estimated internal consistency to be about .80 when the measures were administered to two different samples. In the current study, the Spearman-Brown estimates of internal consistency were .77 for role conflict and .81 for role ambiguity. Coefficients of reproducibility of .89 and .90, a minimum marginal reproducibility of .71 and .74 and coefficients of stability of .67 and .73 were obtained for role conflict and role ambiguity.

Organizational Identification

Five items devised by Miller (Miller, 1967; Miller and Wager, 1971) were used to assess the professional's identification with his or her organization. These items tapped the professional's interest in the organization and its mission and the importance to the professional of recognition from management. The item analysis reported by Miller and Wager (1971) yielded a Guttman scale with a coefficient of reproducibility (Goodenough technique) of .91, a minimum marginal reproducibility of .71, and a coefficient of stability of .68. The analysis of the data obtained in the current study produced respective coefficients of .93, .75, and .70.

Alienation

The measure of alienation was the five-item scale used by Miller (1967). This scale emphasizes the extent of self-estrangement from work. Miller's (1967) analysis of these items produced a Guttman scale with a coefficient of reliability of .91, a minimum marginal reproducibility of .70, and a coefficient of stability of .69. Analysis of the items as utilized in the present study provided coefficients of very similar magnitudes: .90, .72, and .70, respectively.

Measurement Contamination

Inevitably, some concern over measurement contamination arises. The measures of role conflict, role ambiguity, organizational identification, and alienation may produce spurious intercorrelations because they come from the same self-reports and, particularly, because all four of these constructs tap the affective domain. We thus sought means of assessing a "generalized affect" in accounting for the statistical relationships. To explore this possibility, factor analysis was used to extract a first general factor from the intercorrelations. (If all four variables load appreciably on this factor, it can plausibly be regarded as one representing either "response set" or "diffused affect.") The partial correlations (with this factor controlled) were then examined.

With this procedure, we found a partial correlation between role conflict and role ambiguity of −.52 ($p < .001$). The negative value conforms both to the expectation that formalization would have opposite effects on these variables and to the more general assumption that conditions that reduce role ambiguity tend simultaneously to increase role conflict.

The remaining partial correlations (all significant at $p < .05$ or less) were in the direction opposite of that expected, however. Role conflict and role ambiguity both correlated positively with organizational identification and negatively with alienation; organizational identification and alienation correlated positively with each other. Furthermore, the measures of organizational identification and alienation loaded considerably higher (−.74 and .79, respectively) on the general factor than did the measures of role conflict and role ambiguity (.51, .51). Perhaps the measures of organizational identification and alienation conjoin simply because of a common affective factor.

Extracting the general factor may of course remove genuine as well as artifactual covariance given the inherent affective nature of both organizational identification and alienation. Nonetheless, the results and analysis should be interpreted with recognition of possible cross-contamination of organizational identification and alienation.

ANALYSIS

Path analysis (e.g., Duncan, 1966) suggested itself as the obvious strategy for decomposing and assessing the comparative magnitudes of effects of formalization on role conflict, role ambiguity, organizational identification, and alienation. However, path analysis requires an explicit, nonrecursive causal model (and relies on the usual assumptions underlying any form of multiple regression), and the literature on alienation of professionals has not provided such explicitness. The analysis therefore included an intermediate step of assessing the fit of various plausible causal models. The Simon-Blalock method (Simon, 1956; Blalock, 1964) was used. This method tests the fit between a particular causal model and the data by showing whether the relevant partial correlations between variables not directly linked in the model approximate zero. Like path analysis, this procedure assumes non-recursiveness; it requires also that bivariate relationships are not confounded by unmeasured variables, and it relies on other assumptions of multiple regression.

The data were used to test several plausible models, and all but one of these were rejected. The analysis proceeded to the computation of path coefficients for a fleshed-out path diagram. The empirical fit of the final path-analytic model was assessed by determining how well the model reproduced the zero-order correlations among the variables.

Table 1

Means of Measures

	Formalization	Role Conflict	Role Ambiguity	Organizational Identification	Alienation
Electronics Firm:					
Engineering	34.01 (2.88)	28.21 (7.92)	26.26 (5.71)	11.23 (3.07)	9.00 (2.99)
Applied Research	30.36 (0.83)	27.57 (7.86)	27.95 (5.52)	10.71 (1.98)	8.86 (2.71)
Basic Research	27.23 (2.69)	31.82 (7.78)	25.47 (6.00)	10.38 (2.80)	10.18 (3.36)
Air Frame:					
Engineering	46.89 (2.38)	32.98 (6.78)	21.30 (5.28)	13.78 (3.46)	8.13 (2.69)
Applied Research	44.45 (1.74)	33.84 (5.69)	22.64 (6.11)	11.32 (3.79)	9.56 (2.79)
Basic Research	36.95 (4.16)	32.15 (4.97)	28.75 (7.19)	11.00 (3.24)	8.60 (2.50)
Paper Products:					
Engineering	39.89 (3.08)	30.67 (6.38)	25.17 (7.14)	12.63 (3.69)	9.37 (2.98)
Applied Research	33.68 (2.03)	30.53 (6.74)	25.29 (5.06)	12.53 (2.18)	7.88 (2.47)
Basic Research	26.38 (1.74)	27.34 (4.66)	34.38 (8.56)	10.57 (2.50)	9.86 (2.17)

RESULTS

Descriptive Data

Table 1 provides means and standard deviations of the measures according to the respondents' organizations and job orientations (engineering, applied research, or basic research).

As expected, respondents engaged in engineering projects had the greatest extent of unit formalization, those in basic research had the least, and those in applied research units had an intermediate amount (overall F [2,244] $= 71.4$, $p < .001$). Other differences became nonsignificant when formalization was statistically held constant.

The organizations differed significantly in formalization (F [2,244] $= 162.8$, $p < .001$), and this difference remained when job orientation was statistically controlled. The air frame manufacturer was the most formalized organization, probably because virtually all its work was sponsored by government military contracts and was therefore subject to rather rigid contract specifications and short lead times. The electronics firm was least formalized, the paper firm intermediate. There were no other significant differences among organizations in the overall analysis.

There were no significant ($p < .05$) interactions between organization and job orientation on any of the measures.

Zero-Order Correlations

Table 2 displays the pairwise correlations between the six variables. The strongest bivariate relationships involved formalization and organizational identification. All of the correlations were statistically reliable except the one between job orientation and role conflict. The apparent null relationship between job orientation and role conflict is misleading, however, as analyses below indicate.

Simon-Blalock Analysis

The best fitting plausible causal model that emerged from application of the Blalock (1964) procedure to a test group of half the total sample appears in Figure 1; the fit of the model with the predicted partial correlations in both the test group and a validation or "holdout" group, comprised of the remainder of

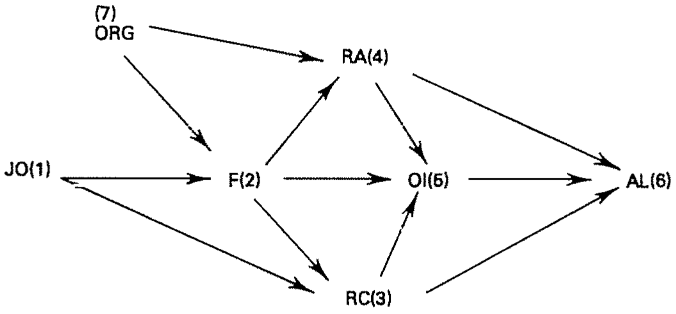
Table 2

Intercorrelations Between Variables

	1	2	3	4	5	6	7	8
1. Job Orientation	1.00*							
2. Formalization	−.61	1.00						
3. Role Conflict	.00	.24	1.00					
4. Role Ambiguity	.28	−.40	−.19	1.00				
5. Organizational Identification†	−.25	.33	−.19	−.25	1.00			
6. Alienation	.13	−.14	.31	.25	−.46	1.00		
7. Air Frame	−.09	.73	.24	−.24	.16	−.10	1.00	
8. Paper	.01	−.17	−.10	.19	.06	.02	−.45	1.00

*For $|r| \geq .\ 3, p < .05; |r| \geq .18, p < .01$.
†Membership in organization defined as nominal (dummy) variable, with electronics firm as comparison or reference coded 0,0.

the sample, is shown below the model. According to this model, the job orientation in a unit and the organization to which the unit belongs determine the extent of formalization in the unit; the most basic research results in the lowest degree of formalization. The job orientation also determines the extent of role conflict, and formalization increases role conflict. (Empirically, job orientation and role conflict are unrelated [zero-order $r = .00$] because of offsetting effects: the jobs with the greatest potential for role conflict are simply the least formalized.) Formalization also acts to reduce role ambiguity and to increase identification with the organization. Both of these relationships reduce alienation, while the effect of formalization on role conflict increases alienation.



AL = Alienation
F = Formalization
JO = Job Orientation
OI = Organizational Identification
ORG = Organization
RA = Role Ambiguity
RC = Role Conflict

Figure 1. Best-fitting causal model.

Prediction Equations	Actual Partial r's* Test Group ($N = 124$),	Holdout Group ($N = 123$)
$r_{17} = 0$	−.096	.010
$r_{14.2} = 0$	.047	.049
$r_{15.23} = 0$	−.017	.001
$r_{16.23} = 0$	.022	.041
$r_{34.2} = 0$	−.105	−.096
$r_{37.2} = 0$	.068†	.088†
$r_{57.24} = 0$	.093†	.138†
$r_{67.24} = 0$	.083†	.069†
$r_{26.345} = 0$	−.011	.003

*None were statistically significant at $p < .05$.
†Multiple partial r between organizations (as a set of nominal variables) and respective other variables.

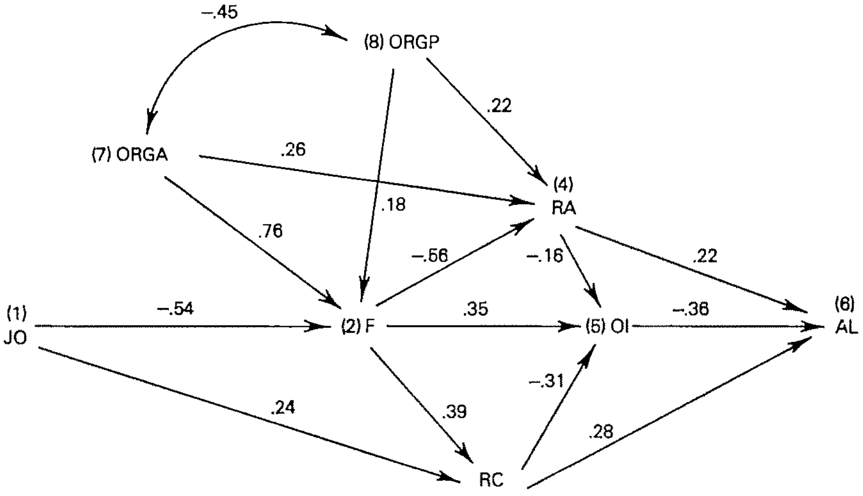
This model provides a reasonably good fit to the prediction equations. It cannot, however, account for the negative relationship between role ambiguity and role conflict. According to the model, this relationship should be nil when formalization is statistically controlled, but the empirical partial correlation is not zero (although it is smaller than the corresponding zero-order correlation).

When differences in formalization are statistically removed, both the paper products and air frame companies contributed to greater role ambiguity than the electronics firm did. While raw means suggested that respondents from the air frame maker felt less role ambiguity than other respondents felt, this low role ambiguity was due to the air frame maker's extent of formalization, yet role ambiguity in this company was greater than it "should" have been, given the company's extent of formalization. The direct effect on role ambiguity of membership in the air frame firm could possibly be attributed to the frequency of rush orders, changes, or cancellations of projects from its military clients. No analogous explanation is at hand for the effect of membership in the paper products firm, but perhaps possible informal managerial or administrative procedures were at odds with established, formalized specifications.

The effects of organization membership, while obviously not of interest in a generalizable conceptual sense, do appear to fit into a model of broader appeal: the organization's effects on alienation, organizational identification, and role conflict can be traced essentially to the organization's degree of formalization, and to a lesser extent to idiosyncratic sources of role ambiguity.

Path Analysis

The method of path coefficients or path analysis (e.g., Duncan, 1966) was used to estimate and compare the magnitudes of the effects of different variables on each other. Essentially, this approach represents sequential regression analyses of antecedent and dependent variables at various points in the model, with the data reordered into normalized form. The standardized



ORGA = Air frame manufacturer
ORGP = Paper products firm

Note: All coefficients significant at $p < .05$.

Figure 2. Model with path coefficients.

beta (path) coefficents in the regression equations then estimate the relative direct contributions of variability in immediate causal factors to variability in the "effect" (or dependent variable). One advantage of the standardized beta values is that differences in units of measurement do not complicate interpretation of the analysis.

The utility of path analysis as an interpretive tool lies in its power to decompose bivariate correlations into various direct and indirect paths in which one variable is presumed to affect another. This property is particularly useful when, as in this instance, one posits effects that are opposites of one another.

The computed path coefficients are shown in Figure 2 within the framework of the model that emerged as the best fit to the data.

Formalization clearly occupies a rather pivotal space in the nexus of paths contributing to alienation. There are two paths through which it tends to increase alienation, as seen in Figure 2. One runs from formalization to role conflict to alienation (effect $= .39 \times .28 = .11$); the other through role conflict to organizational identification to alienation (effect $= .39 \times -.31 \times -.36 =$.[illegible]4). Thus, an estimate of the effect that formalization has in producing alienation, because of the inducement or arousal of role conflict, is .15 (.11 + .04).

However, there are paths through which formalization acts to reduce alienation. Formalization reduces role ambiguity, which in turn directly contributes positively to alienation (effect of formalization through this path = −.12); reduction of role ambiguity also increases identification with the organization and thus reduces alienation (effect of formalization through this path = −.03). Finally, formalization directly contributes to

Table 3

Decomposition of Correlations Involving Formalization as a Prior Causal Variable

Dependent Variable	Correlation
Role Conflict:	
Direct Effect	.39
Spurious (because of JO)	−.13
Unexplained	−.02
Total Correlation	.24
Role Ambiguity:	
Direct effect	−.56
Shared (with ORG)	.14
Unexplained	.02
Total Correlation	−.40
Organizational Identification:	
Direct effect	.35
Indirect via role ambiguity	.09
Indirect via role conflict	−.12
Spurious	.02
Total Correlation	.34
Alienation:	
Indirect via role ambiguity	−.15
Indirect via organizational identification	−.13
Indirect via role conflict	.15
Spurious (with role conflict)	−.06
Spurious (with role ambiguity)	.05
Total Correlation	−.14

identification with the organization and tends to reduce alienation in this fashion also (effect = −.13). The negative indirect effects of formalization on alienation sum to −.28. The net effect of formalization, then, is a slight tendency (−.13) to reduce rather than to increase alienation of professionals.

Table 3 summarizes the information extracted from the path analysis by breaking down the observed correlations between formalization and other variables into direct effects, indirect effects, spurious covariance, and unexplained covariation. The direct effects are the path coefficients linking the variables; indirect effects are those mediated by other variables and in each case equal the product of the coefficients traversing the indirect path. Spurious correlations are those due to a common source of variation preceding both variables in the path. Unexplained correlations refer to the residuals that remain when the sum of the above effects is subtracted from the observed total correlation.

The adequacy of the fit between the model with computed path coefficients and the raw data can be assessed by observing how well the model reproduces the zero-order correlations (Griffin, 1977). The correlation between each pair of variables is estimated by summing the direct effect, the indirect effects, and the "spurious" effects due to common or related causes. The values derived in this fashion were compared with the computed zero-order r's. The average absolute value of the differences was .0222; the variance (.0010) of the differences was significantly less than the variance (.0036) of a true correlation of $r = 0$ for this sample size, suggesting a good fit.

DISCUSSION AND CONCLUSIONS

Formalization and Job Orientation

Before considering the implications of the findings concerning the effects of formalization, one should remember that formalization itself was largely accounted for by the job orientation in the work unit. Engineering work was associated with the highest level of formalization, basic research with the lowest, and applied research with the intermediate level. If this ordering of job orientation reflects to any appreciable extent the degree of the participants' professionalization, then it demonstrates empirically that professionalization and formalization are inversely related. Alternative interpretations are possible, however. One might relate the connection between job orientation and formalization to the notion of "substitutes for leadership" (Kerr and Jermier, 1978). Formalization and leadership, both of which function to give structure to job activities and the work environment, can be regarded as substitutes for each other, to some extent. Kerr and Jermier (1978) viewed professional orientation as an additional substitute for leadership; perhaps, then, it can also serve as a substitute for formalization.

Hall (1968), who found modest negative correlations between professionalization and bureaucratization, suggested that either or both of the following causal dynamics could account for such findings: (1) the presence of professionals affects the structure of the organization, because professionals have standards to which the organization must adjust; (2) the presence of bureaucratic systems may inhibit further professionalization of weakly professionalized groups.

Formalization and Professional Involvement

One variable that proved useful in analyzing the effect of professionalization on formalization was the highest educational degree received by respondents. Extent of education, of course, represents at best a structural dimension of professionalization, i.e., formal training. It does not necessarily reflect attitudinal dimensions of the construct, nor does it imply the existence of a continuum of professionalization. Educational degree was coded on an ordinal scale from 1 (some post-secondary education, without degree) to 5 (Ph.D.), and analysis showed that average degree levels were significantly higher in basic research than in applied research or engineering ($F = 6.87, p < .001$). The latter two were not significantly different from each other. The partial correlation between job orientation and formalization, with educational degree statistically controlled, was still −.54; with job orientation controlled, the partial correlation between degree and formalization was −.40. Thus, while differences in formalization due to job orientation cannot be accounted for solely by differences in formal training of incumbents, the extent of professionalization, in this structural sense, may retard formalization.

This study suggests that, within the limits on formalization set by the apparently strong effect of job orientation, formalization has opposing effects on alienation among professionals. On the one hand, formalization tends to activate role conflict that otherwise remains latent in the more professionalized groups. This role conflict fosters alienation in part because it inhibits identification with the organization; this finding is consistent with Miller's (1967) conclusion. On the other hand, formalization tends to reduce role ambiguity.

Formalization and Ambiguity

Hall (1968: 104) noted, "too little bureaucratization may lead to many undefined operational areas if the profession itself has not developed operational standards for these areas." An accumulating literature, beginning with Kahn et al. (1964), documents the adverse effects of role ambiguity, which include somatic tension, anxiety, a sense of futility, and low job satisfaction. While professionals undoubtedly seek a measure of autonomy and discretion in the technical core of their work, they can apparently nonetheless suffer from lack of clarity in their roles and in the organizational context within which they carry out their activities.

Formalization and Organizational Identification

Formalization also tends, according to this study, to provide a basis for identification with the organization. One can only speculate as to exactly what this basis is and what its psychological dynamics must be. A plausible explanation relies on what Glaser (1963) labelled "institutional motivation." Formalization might serve to articulate the congruence between organizational mission and professional goals. Glaser argued that the perception of such congruence reduces the strains between organizational and professional requirements that otherwise divide loyalty between distinct local and cosmopolitan types. Furthermore, Greene (1978) showed that identification with the organization does not necessarily occur at the expense of identification with the profession.

Formalization might also make the organization more meaningful to the professional by providing a Gestalt within which he can define more reassuringly the nature of his own contribution to the larger enterprise.

Rotondi (1975) interpreted findings from 107 scientific and engineering personnel to indicate that organizational identification may produce dysfunctional outcomes such as decreased effectiveness and creativity. In his data, however, organizational identification also correlated significantly and negatively with a measure of occupational identification. His four-item measure of organizational identification included an item pertaining to desire to spend career with the organization, which may have produced variance in the overall measure (related to managerial aspirations). Whether by virtue of his operationalization of the construct, "organizational identification," or because of the particular environment of his respondents, organizational identification in his sample did occur at the expense of professional orientation. While this relationship *can* occur, it is not inevitable, as Glaser (1963), Goldberg (1976), and Greene (1978) have shown.

Goldberg (1976) took a position in direct contradiction to Rotondi's interpretations. He found evidence that even the cosmopolitan professional may, at the high point of his career, turn toward the organization for the purpose of "developing an organization around himself ('empire building')" (1976: 336) or may become more involved in the basic operation of the organization. Because formalization helps define organizational expectations and avenues of influence, it should facilitate such a redirection of interest or orientation even for the cosmopolitan. At any rate, there seems to be no obvious reason to believe that increased identification with the organization inevitably leads to dysfunctional performance.

Formalization and Conflict

Similarly, increased formalization does not inevitably increase role conflict. Such a relationship did exist in the organizations under scrutiny here, but the analyses suggest that administrators should not be primarily concerned about overall strategies to reduce formalization. Instead they should focus their attention on making organizational guidelines consistent with professional norms, when possible. However, management should avoid high degrees of formalization in situations (e.g., boundary-spanning roles) in which the obvious effect would be to activate a great deal of role conflict that otherwise would be latent. In other words, given the overall beneficial effects of formalization, management not only should continue to provide necessary, well-defined organizational guidelines for professionals, but should also take actions to reduce potential for role conflict.

Formalization and Alienation

This study does not show that formalization has an inexorable net effect of generating alienation. The positive effects of formalization in retarding alienation can be related to the components of alienation defined by Seeman (1971) as follows. (1) Powerlessness: formalization may facilitate access to a resource and knowledge base, which leads to a sense of greater autonomy and power; (2) meaninglessness: formalization provides a framework for the professional to view his contributions to the organization and the organization's contributions to his professional goals; (3) normlessness and isolation: formalization may reinforce many external norms for professionals and reduce role ambiguity (a normless state); (4) self-estrangement: if, as Kanungo (1979: 124) argued, "all other forms of alienation eventually result in self-estrangement," then the converse should be true; by providing the professional with a greater scope and clearer context for self-expression in work, formalization may prevent self-estrangement.

We should make explicit the caveats that belong here. First, we do not argue for a linear or one-to-one relationship between formalization and its net positive effects. Rather, like Engel (1969), we believe that formalization up to some optimal level has these beneficial effects, but obviously one can conceive of excesses. Second, the results presented here may reflect a selective attrition over time, in which professionals alienated by formalization were filtered out. Finally, we remind the reader of the possible contamination in some of the measures. In particular, the measures of organizational identification and alienation are perhaps not measures of distinct phenomena.

We suggest, nonetheless, that the conflict between formalization of organizational context and professional job involvement is neither omnipresent nor inevitable. The professionalization of the work force neither presages unmanageable tensions nor dooms the bureaucratic structure to extinction.

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Environment, Strategy, and Power Within Top Management Teams

Donald C. Hambrick

This study distinguishes two sources of critical contingencies for organizations: environment and strategy. In turn, it explores how coping with each type of contingency is related to power within top management teams. Executives had high power if, by virtue either of their functional area or scanning behavior, they coped with the dominant requirement imposed by their industry's environment. Power patterns within each industry were further affected by the extent to which executives coped with the contingencies posed by their organizations' particular strategies. A temporal critical contingencies model of power is proposed.•

THEORETICAL FOUNDATIONS

Theorists have argued the existence of a variety of bases of power in organizations (French and Raven, 1959; Emerson, 1962). One relatively recent line of inquiry has focused on "coping with uncertainty" as a basis of power. Hickson et al. (1971), building on patterns observed by Perrow (1961), Crozier (1964), and others, suggested that power accrues to subunits that cope with uncertainties, or "strategic contingencies," facing the organization. The attraction of the strategic contingencies view is that it allows a theoretical linkage among environmental, political, and structural models of the organization.

Although uncertainty is generally regarded as the basis for a strategic contingency, the sources of such contingencies have not actually been systematically considered in research on power. Technology (Crozier, 1964; Woodward, 1965; Godiwalla, 1977), workflow (Hinings et al., 1974), and the external environment (Perrow, 1970) have all been seen as creating uncertainties and, in turn, strategic contingencies. Clegg (1975), in his criticism of the "opacity" of the uncertainty construct in the Hickson et al. model (1971), was one of the few to call attention to the lack of explicit consideration of different sources of contingencies.

A closer look at the sources of contingencies, and their interactions, is important to understand fully past research on intraorganizational power and to chart future research. This paper draws on two complementary theoretical streams to propose that the environment of an organization and its strategy for navigating within that environment are distinct yet intertwined factors that account for the "critical contingencies" that an organization faces and, in turn, for the power patterns within the organization. The term "critical contingency" has been substituted for the term "strategic contingency" used by Hickson et al., in order to indicate that a contingency need not have its origins in the organization's "strategy," per se.

These two constructs — environment and strategy — stand at the crux of the controversy over whether natural selection or adaptive models better describe organizational reality (Pfeffer and Salancik, 1978; Aldrich, 1979; Van de Ven, 1979). Both views have merit. Organizations are "embedded" in their environments, but often loosely so. They have some leeway for navigating. Thus, internal structure and process, including power distribution, will reflect both environment and strategy.

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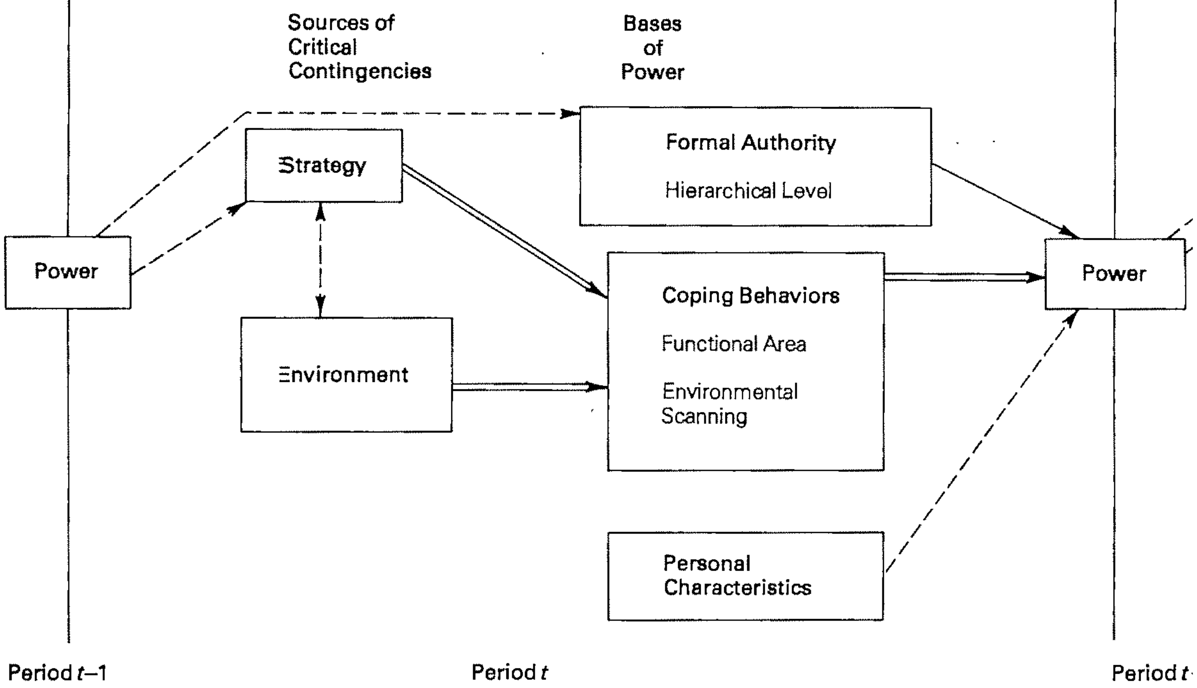

Figure. A (temporal) critical contingencies model of power.

Even though the environment may favor a particular strategy, other strategies — which typically fill "niches" — can succeed (Child, 1972; Miles and Snow, 1978). Organizations may pursue strategies seemingly at odds with the environment because of the values and internal political processes of their dominant coalitions or because of their assessments of their relative strengths and weaknesses (Allison, 1971; Andrews, 1971; Mintzberg, 1978).

A model is presented in the figure that shows sources of power. The double lines represent the parts of the model that are tested in this paper. Dotted lines portray relationships outside the scope of this study. The model depicts the environment and strategy of an organization as distinct sources of critical contingencies. Executives engage in different amounts and types of coping with contingencies. The focus is on executives' functional areas, or how they are "situated" to cope, and on their environmental scanning activities, a form of what Hickson et al. (1971) would call "coping by information." There are sources of power in addition to coping: formal hierarchical authority (accounted for in this study and represented by a single solid line) and personal attributes, which are not measured here.

The figure includes a temporal dimension, to distinguish between power as a cause and as an outcome. For example, current strategy is a reflection of earlier power patterns (e.g., Allison, 1971), just as current hierarchical positions may be considered "fossilized" reflections of earlier power patterns (Hickson et al., 1971; Clegg, 1975). Similarly, current power patterns affect future strategy and hierarchical arrangements.

Environmental Requirements

Organizations are not only political systems; they are also open systems dependent on exchanges with their environments (Katz and Kahn, 1966). Most organizations are dominated in some way by their environments (Thompson and McEwen, 1958). The forms of domination differ, but they always involve the environment's control over scarce resources and are problematic in some way (Pfeffer and Salancik, 1978). Lawrence and Lorsch (1967) argued that one or two "dominant environmental requirements" typically dominate any one industry's landscape. Such requirements could include technological uncertainty, regulatory demands, raw material shortages, or supply-demand imbalances.

For purposes of operationalization, it is useful to restrict the array of environmental requirements considered. The approach in this paper, suggested by Hickson et al. (1971: 219), is to conceive of a dominant environmental requirement as impinging on any one of the three stages in an open system: input, throughput, or output (Katz and Kahn, 1966). One can conceive of severe raw material or personnel scarcities as environmental constraints on the input process. External pressures for lower costs or faster throughput are primarily directed at the throughput process. New product technologies, changing market preferences, and competitors' product initiatives impose environmental requirements on the organization's output. In reality, the three stages are interdependent and cannot be isolated. However, for purposes of this study, it is useful to conceive of a dominant environmental requirement as having primary impact on one of three stages.

Strategic Requirements

Although organizations are embedded in environments that impose certain requirements on them, they have some latitude within their environments. Firms within an industry can select various strategies, that is, fundamental ways of competing or prospering (Child, 1972; Aldrich, 1979). The term strategy is used here in the descriptive sense to mean a pattern in a stream of important decisions (Miles and Snow, 1978; Mintzberg, 1978).

Every strategy poses some critical contingency, or "strategic requirement." This requirement may or may not align with the requirements imposed by the environment, even though normative models stress the importance of such an alignment (e.g., Andrews, 1971). For example, among the plastics firms observed by Lawrence and Lorsch (1967) a firm with a strategy of developing and marketing new plastic compounds would have faced a strategic requirement in line with the industry's dominant environmental requirement, new product development. In contrast, a firm with a strategy of low prices and a stable product line would have faced a strategic requirement at odds with the industry's dominant environmental requirement. The first firm faced a single critical contingency that emanated both from its overall industry environment and from its particular strategy. The second firm faced two conflicting contingencies: the industry's impetus to generate new products and the firm's need for stability and efficiency to exploit its strategy of low prices.

Most existing frameworks for viewing business-level strategies are normative, highly situational, and not appropriate to research where the aim is generalizability across industries (see Glueck, 1976, and Hofer and Schendel, 1978, for examples). A recent exception is the typology offered by Miles and Snow (1978). They identified three recurring types of viable business strategies. Prospectors compete primarily by engaging in substantial new product/market development but pay relatively little attention to efficiency. They prosper by stimulating and meeting new market opportunities. Defenders maintain a position in a market by offering low prices, excellent service, high quality, or prompt delivery. They engage in little new product development. Analyzers have some of the characteristics of each of the two extreme strategies. They make product/market changes more selectively and slowly than Prospectors and pay less attention to efficiency and stability than Defenders.

This study relies on the Miles and Snow typology for three reasons: it is based on empirical research in several industries; it allows identification of extreme "opposite" strategies in a variety of industries; and Miles and Snow made untested speculations about power patterns that might exist in their typology. The typology also meshes with the portrayal in this paper of the organization as an open system. It can be reasoned that the strategic requirement for Prospectors is to attend to the output task — monitoring and adjusting products and markets. For the Defenders, the strategic requirement is to excel at the throughput task — improving the efficiency and quality of the transformation process. Analyzers face a combination of these two requirements. None of the types suggest a dominant link to the input task. The primary interest here is in the extreme types — Prospectors and Defenders — in an attempt to test how strategy and environment interact and to determine what types of coping behaviors are related to power.

Coping

Coping with uncertainty, not simply the existence of uncertainty, is what gives power (Hickson et al., 1971). Since the goal of this study is to elaborate the sources of contingencies rather than to test distinctions among different types of coping behavior, the study is restricted to two forms of coping — one fairly broad and one quite narrow. Functional area, the broad type of coping examined, is actually a surrogate for coping. An executive's functional area partly determines how well situated he or she is to cope with critical contingencies. The average marketing executive, for example, can be assumed to be better situated to cope with output-oriented contingencies than the average accounting executive.

Environmental scanning is the second, narrower type of coping considered here. Scanning — the process of learning about events and trends in the organization's environment — is a form of "coping by information" (Hickson et al., 1971). As such, it is part of the "boundary spanning" activity (Adams, 1976; Tushman, 1977). Scanning has been documented consistently as a strikingly informal activity, conducted to some extent by all middle- and top-level executives (Aguilar, 1967; Kefalas and Schoderbek, 1973; Hambrick, 1979). The same research has also indicated that considerable cross-functional scanning occurs, such as market scanning by financial executives. Scanning has no rigid structural bounds and thus appears to be a relatively fluid base of power.

This paper proposes that there are four parts of the environment that executives can scan in varying amounts. Three follow Miles and Snow's (1978) classification of top management tasks — output (entrepreneurial), throughput (engineering), and administrative; the fourth is the ubiquitous regulatory environment:

Output environment: external product/market trends or events. Example: demographic shifts affecting demand for new products or services.

Throughput environment: external developments bearing on the processing or delivery of products/services. Example: new developments in process technology.

Administrative environment: external developments bearing on the determination of roles and relationships in the organization. Example: new approaches to organization design.

Regulatory environment: government regulations, taxes, sanctions, accreditations, litigation, etc. Example: court cases involving the industry.

Pilot interviews in several industries indicated that this is a generally relevant partitioning of the environment and that the four categories are fairly comprehensive and generally (though not totally) mutually exclusive. The omission of an input sector in the categorization is a shortcoming, but it should not detract from the primary goals of the study.

HYPOTHESES

In this paper it has been argued that both environment and strategy can pose contingencies for an organization. Executives who cope with these contingencies will have relatively great power within their management teams. The first set of hypotheses suggests that the broad industry environment affects power patterns.

Hypothesis 1. In an industry whose dominant environmental requirement is product/market adjustment and innovation, executives who cope with the output task will have relatively great power within their management teams. Specifically, in such an industry:

Hypothesis 1a. There will be a positive association between being in output functions (marketing and product/service development) and power.

Hypothesis 1b. There will be a positive association between output scanning and power.

Hypothesis 2. In an industry whose dominant environmental requirement is efficiency/cost control, executives who cope with the throughput task will have relatively great power within their management teams. Specifically, in such an industry:

Hypothesis 2a: There will be a positive association between being in throughput functions (accounting, operations, process improvement) and power.

Hypothesis 2b. There will be a positive association between throughput scanning and power.

The second set of hypotheses suggests that the strategy of an organization within its environment also affects power patterns.

Hypothesis 3. Coping with the output task will be more strongly associated with power in Prospectors than in Defenders in an industry.

Hypothesis 3a. There will be a stronger positive association between being in output functions (marketing, product/service development) and power in Prospectors than in Defenders.

Hypothesis 3b. There will be a stronger positive association between output scanning and power in Prospectors than in Defenders.

Hypothesis 4. Coping with the throughput task will be more strongly associated with power in Defenders than in Prospectors in an industry.

Hypothesis 4a. There will be a stronger positive association between being in throughput functions (accounting, operations, process improvement) and power in Defenders than in Prospectors.

Hypothesis 4b. There will be a stronger positive association between throughput scanning and power in Defenders than in Prospectors.

The hypotheses imply certain interactive effects of environment and strategy on power. In an organization whose environmental and strategic requirements are the same, we would expect particularly pronounced power patterns. For example, in a Prospector within an industry whose environment primarily requires product/market innovation, we would expect to find that coping with the output task is strongly and unequivocally related to power. Conversely, in an organization whose environmental and strategic requirements are at odds, we would expect to find more diffuse and ambiguous power patterns in response to the multiple, competing demands that the organization faces.

METHODOLOGY

The Selected Industries and Their Environments

In order to represent different types of dominant environmental requirements, organizations from three "industries" were selected for study: private general hospitals, life insurance firms, and private four-year colleges. Considerations in choosing these three industries were that both the profit and not-for-profit sectors were represented, that the Miles and Snow typology was applicable to them, and that they were accessible. The approach to characterizing the environments of these three industries was qualitative, in the vein of Hirsch (1975) and Kimberly (1975), and as urged by Downey and Ireland (1979) in their review of previous attempts to measure environmental characteristics. Specifically, the study relied on interviews with scholars and executives and on recent literature about the three industries to identify their dominant environmental requirements.

Hospitals and their environments. Evidence at the time this research was conducted consistently indicated that efficiency/cost cutting was the dominant environmental requirement confronting private, nonteaching community hospitals. The severe external pressures on hospitals to become more cost-efficient are widely recognized. Certificate of Need legislation, Professional Standard Review Organizations, and the recent

National Health Planning and Resources Development Act have all been designed to increase efficiency in hospitals. Furthermore, the environment confronting hospitals must be considered "clustered" (Emery and Trist, 1965), consisting of major forces all opposed to cost escalation: third-party payers, state governments, insurance companies, industrial corporations, and the federal government.

Insurance firms and their environments. Evidence indicated that the environment of the insurance industry primarily required it to develop new products and new markets. First, insurance companies were under considerable pressure to design new policies to meet the needs of a dramatically changing market and to stay competitive with other financial service industries that were broadening their domains. Second, the industry was faced with serious threats to its existing lines. For example, rampant inflation and the prospect of some form of national health insurance caused firms to consider new, replacement lines such as variable annuities, mutual funds, real estate, and so on. A third factor causing primary attention to the output task was not so much an environmental requirement as a market condition. Executives consistently indicated an industry-wide perception that insurance consumers are not price-sensitive. The primary competitive tools that companies have are product features and agents' selling skills (and agents are drawn to firms with new and innovative products). Thus, not only were the firms under pressure to develop new products, but they were also not under much market pressure to lower costs or to improve efficiency.

Colleges and their environments. At the time of the research, medium-quality (mean Scholastic Aptitude Test scores of 1000 to 1200) private, four-year colleges were in the midst of an era of stable enrollment. This unfamiliar market condition elicited mixed responses ranging from market adaptations, such as adult education and semiprofessional programs, to cost cutting. In short, the type of colleges studied did not appear to face a single dominant environmental requirement. They did face a relatively new environmental trend (decreased market size), but no party in their environment was so influential as to impose a particular mode of adaptation. They were neither elite enough to face stiff resistance to change from their constituencies nor locally dependent enough to have to respond to local requests for pragmatic programs. The colleges in this study thus serve somewhat as a control group, with no apparent dominant environmental requirement.

Identification of Extreme Strategic Types

An integral step in the study was to identify organizations at the strategic extremes — Prospectors and Defenders — within their industries. Working from three homogeneous sets of organizations (29 colleges, 33 hospitals, and 15 life insurance firms), two independent methods were used to assess strategies: (1) quantifiable published data from annual industry source books on product/market additions, and (2) assessments by expert panels. Only organizations whose strategies were rated at the extremes by both methods were selected for study. Thus, the Prospectors selected had introduced significantly more new products/services in the previous four years than had the Defenders, and they were regarded by industry experts as significantly more Prospector-like than the Defenders. The classification process yielded four "pure" Defender and four Prospector colleges, three Defender and three Prospector hospitals, and three Defender and three Prospector insurance firms.

Since a major shortcoming of external measures of strategy is that they can lack currency (Snow and Hambrick, 1980), interviews were conducted with the chief executives of all 20 of the selected organizations to determine whether their assessments of current strategic behaviors corresponded with the external assessments. We asked only about concrete recent or planned product/service/market changes, rather than about impressions of "strategies." The interviews indicated that one Prospector college, one Defender college, and one Prospector hospital had recently moved toward an Analyzer strategy. Since the data conflicted on their strategies, those three organizations were not included in analyses involving strategy, although they were included in industry-level analyses. A more detailed description of the college classification process and an overview of the general process are presented in Appendix A.

The three samples had important limits. The organizations studied were all "medium-sized" within industries not known for strategic sophistication. Data drawn from larger or more sophisticated organizations may have yielded different results. Second, the diffuse authority known to exist in professional organizations such as colleges and hospitals may have affected the findings in ways that are estimated in the discussion section. Finally, by focusing only on extreme Prospectors and Defenders, the study maximized the opportunity to observe the hypothesized relationships. A more random sample might not have yielded any observable patterns or, alternatively, might have yielded more information about the subleties of strategy-power patterns that exist in an array of strategic types.

Data Collection and Measurement

Each chief executive was asked to identify executives within his or her organization to participate in the study. These were to include her or himself, all second-level executives, and a sample of (or all) third-level executives, up to a maximum of twelve per organization. The limit of twelve assured that no organization was disproportionately represented in the sample. Each chief executive agreed to distribute the mailed questionnaire packets and to encourage participation in the study.

The chief executives in the 20 organizations suggested a total of 203 executives as participants. Of those, 195 responded usefully to the questionnaire, with a response rate for each industry of at least 95 percent. Interviews were also conducted with executives in six of the participating organizations — one Prospector and one Defender randomly selected from each industry. This paper primarily presents questionnaire results, with limited elaboration based on the interviews.

Identifying executives' functions. Executives were asked to indicate which standard functional area(s) characterized their own responsibilities (Appendix B). The eight functions, which were generated and defined through literature reviews and assistance from executives in the three industries, were accounting/finance, external relations, general management, marketing, personnel, process improvement, product/service development, and operations.

The functional areas were defined in very general terms so that, for example, the "marketing" function would logically apply to, say, a college admissions director. An executive's rating of his or her involvement in each area could take one of four ordinal values: 3 (most similar to my responsibilities), 2 (second most similar), 1 (third most similar), or 0 (not ranked). Allowing respondents to rank multiple functions captured hybrid tasks that do not align with a single function.

Measuring scanning activities. Developing valid and reliable measures of environmental scanning activities was one of the most problematical parts of the research, since scanning tends to be fragmented, informal, and ad hoc (Aguilar, 1967; Mintzberg, 1973). The multiple measures developed for this complex managerial activity have been reported elsewhere (Hambrick, 1979) but are summarized here.

Three methods were used to measure the amount of scanning of the four environmental sectors (output, throughput, administrative, and regulatory) by the executives. The first method asked the executives how frequently (7-point interval scale) they learned of events or trends in 20 subsectors of the environment, each subsector aligning with one of the four broad sectors. The portion of the college questionnaire dealing with the frequency method is presented in Appendix C. The second method asked the executives to rate (5-point ordinal scale) their interest (the extent to which they made a point of staying abreast) in the same 20 environmental subcategories used in the frequency method. The third method asked what percentage of time spent on scanning was aimed at learning of events or trends in each of the four environmental sectors (Appendix D).

Content validity of all items was sought through the use of scholars and executives in the three industries who screened and edited the items. Internal reliability was tested for the multi-item frequency and interest scales. After weak items were dropped, all frequency and interest scales in the three industries consisted of four or five items, which were averaged, and had Cronbach alphas from .65 to .88. A retest administered six weeks later to a sample of the college executives yielded test-retest reliability coefficients of at least .75 for each scanning variable. Applying Nunnally's (1967) standards, the scales were judged to be of adequate validity and reliability for this type of study.

The three measures of environmental scanning activities were combined into a comprehensive scanning index for each sector by converting respondents' scores on each of three measures to Z scores and then by taking the average of the three Z scores as the comprehensive measure of the amount that an executive scanned a given environmental sector. There was no empirical or theoretical rationale for giving different weights to the three measures. The practical range of scanning scores for each sector was about −2.00 to +2.00.

There were two rationales for combining the three measures. First, the correlations among the three measures were consistently between .4 and .6 for each environmental sector in each industry sample, indicating that the three measures were tapping aspects of the same activity but were not overly redundant. Second, the focus was not on the nuances of scanning activity as much as on its more general relationships with power. Accordingly, a combined measure did not detract from the goal, yet it afforded greater parsimony and readability of results.

Measuring power. This study relied on a perceptual measure of power (see Clark, 1968, for the limitations of such an approach). Each executive was asked to rate, on a scale from 1 to 7, the influence of each of the participating executives in the organization on four types of decisions determined a priori to be of major consequence to the organization. Included were decisions on product/market additions, operating budget allocations, major capital expenditures, and organizational redesign (Appendix E). The multiple-respondent measure of power was important because of the potential bias in self-reporting (Nealey and Owen, 1970). The multiple-decision measure was important because of differential power across varying types of decisions (Baldridge, 1971; Hinings et al., 1974).

An executive's power on a specific type of decision is predictably tied to his or her functional area. For example, one would expect that marketing executives would have relatively high power over product-market decisions, accounting executives over budgetary allocations, and so on. These patterns were confirmed in correlation results not presented here. What is of interest, then, is the extent to which an executive has power over the full array of strategic decisions that an organization faces. Accordingly, for each executive, an overall power score between 1 and 7 was generated by averaging all the scores he or she received for the four types of decisions. This approach was empirically justified by Cronbach alphas over .80 for the four-item measure for each industry sample.

A risk in combining the power scores into a composite measure was that extreme differences in the salience of the four types of decisions in organizations may be masked. For example, in a Prospector organization, only product/market decisions may be particularly salient, so that marketing-oriented executives appear to have high power only because ratings of all executives' influence on other types of decisions are very low. The data suggest that this problem did not occur. The mean power score for each type of decision, in each industry and strategic type, ranged only between 3.10 and 3.60 (standard deviations between 1.25 and 1.60).

As a validation test of the power measure, the correlation between power and hierarchical level was calculated, under the assumption that the two variables should be at least moderately correlated. The correlation of .71, .49, and .71 (all $p < .01$) in the college, hospital, and insurance samples, respectively, indicated concurrent validity for the power measure.

RESULTS

Power Patterns in Different Environments

Table 1 shows the relationships between executives' functional areas and power for each of three industry samples.

Table 1

Relationships Between Functional Areas and Power for Three Samples*

	Functional Area							
	Throughput			Output		Other		
Sample	Accounting/ Finance	Process Improvement	Operations	Marketing	Product Development	Personnel/ Industrial Relations	External Relations	General Management
Hospital ($N = 60$)	.22••	.24••	.40•••	−.35•••	−.29••	−.28••	−.43•••	.36•••
College ($N = 74$)	.13	.15•	.09	−.38•••	.16•	.04	−.39•••	.22••
Insurance ($N = 61$)	−.19•	−.04	−.21••	.21••	.23••	.07	−.34•••	.32••

•$p < .10$; ••$p < .05$; •••$p < .01$.
*Kendall partial correlation coefficients, controlling for hierarchical level.
Significance levels of standard partial correlations are reported, since significance levels cannot be calculated for Kendall partial taus (Siegel, 1956).

Hierarchical level was partialled out of the Kendall correlations in order to set aside the effects of formal authority on power (Hickson et al., 1971).

The data indicated relationships between functions and power that conformed strikingly to the hypotheses. In the insurance firms, which faced an environmental requirement for product/market innovation, involvement in the marketing and product development functions was positively associated with power. In the hospitals, which faced an external requirement for efficiency and cost control, the accounting/finance, process improvement, and operations functions were positively related to power. In addition to being individually significant, the differences in the hospital and insurance correlations for all of the output and throughput functions were significant (based on the test reported by Walker and Lev, 1953).

In the colleges, which did not face a single dominant environmental requirement, the relationships between functions and power were somewhat muted and mixed, as expected. Both product development and process improvement functions were modestly ($p < .10$) positively related to power, and the marketing function was negatively related to power.

In all three industries, the general management function was strongly positively associated with power, and the external relations function was strongly negatively associated with power. It is important to recall that external relations was not defined as an output-oriented function, but rather as a public/government/trade relations function.

The data indicated that power was related to an executive's functional situation for coping with the industry's dominant environment requirement. Thus, hypotheses 1a and 2a were supported. It was also hypothesized that power would be related to the extent executives coped with the dominant environmental requirement through their scanning activities. Table 2 shows the relationships between scanning and power. To test the effects of scanning alone on power, without the confounding effects of functional areas that have already been

Table 2

Relationships Between Environmental Scanning and Power for Three Samples*

Sample	Environmental Sector Scanned Output Sector	 Throughput Sector	 Administrative Sector	 Regulatory Sector
Hospital (N = 60)	–.04	.29••	.03	–.17
College (N = 74)	.27••	.32•••	.20••	.22••
Insurance (N = 61)	.38•••	.16	.35•••	–.33•••

•$p < .10$; ••$p < .05$; •••$p < .01$.
*Kendall partial correlations, controlling for hierarchical level and functional area.

reported, both the effects of hierarchical level and functional area were partialled out of the Kendall correlation coefficients.

As hypothesized, hospital executives who scanned the throughput sector — that industry's critical sector — had relatively great power. The correlation was not significantly different, however, from that of the insurance sample. And, as hypothesized, insurance executives who scanned the output sector — that industry's critical sector — had relatively great power. This correlation was significantly greater ($p < .01$) than for the hospital sample. In the insurance sample, scanning the administrative sector was also positively related, and scanning the regulatory sector negatively related to power. In the colleges, scanning of each environmental sector was positively related to power. This finding was consistent with the conclusion that the colleges did not face a single dominant environmental requirement, and it suggests that the colleges valued attention to all fronts. The data generally supported hypotheses 1b and 2b.

Power and Strategy

The remaining hypotheses were aimed at exploring the differences in power patterns in Prospectors and Defenders. To test these, partial correlations that included only the independent variables of key theoretical interest were used. Some functional areas (personnel, external relations, general management) and some scanning activities (administrative and regulatory scanning) were excluded from the analysis because they did not have direct theoretical relevance and in order to retain maximum degrees of freedom (Cohen, 1968). In this analysis, "input function" is a dummy variable representing all executives who indicated their primary function as marketing or product development. "Throughput function" represents all executives who indicated their primary function as accounting, process improvement, or operations.

The results presented in Table 3 indicate partial support for the hypotheses. Hypothesis 3a was not supported in the insurance firms. In Defender colleges, involvement in the output function was negatively related to power, and in Prospectors it was unrelated to power. The difference in the correlations was significant ($p < .05$). A similar "less negative" relationship was observed in Prospector hospitals than in Defender hospitals ($p < .10$), partially supporting the hypothesis.

Table 3

Relation of Prospector and Defender Strategies to Bases of Power for Three Samples*

Basis of Power	Hospitals Prospectors (*N*=20)	 Defenders (*N*=30)	Colleges Prospectors (*N*=20)	 Defenders (*N*=29)	Insurance Firms Prospectors (*N*=31)	 Defenders (*N*=30)
Hierarchical Level	.88•••	.81•••	.77•••	.57•••	.78•••	.70•••
Functional Area						
Output Function	–.32	–.71•••	–.08	–.56•••	.14	–.04
Throughput Function	.08	.41•	–.18	.40•••	–.15	.13
Scanning						
Output Scanning	.18	–.17	.38•	.21	.55•••	.11
Throughput Scanning	.31	.41••	.25	.31•	.03	.35•

•$p < .10$; ••$p < .05$; •••$p < .01$.

*Partial correlation coefficients, controlling in turn for all other forms of coping reported in this table.

Hypothesis 3b was supported in the hospitals and insurance firms. Output scanning was negatively related to power in Defender hospitals, but positively related to power in Prospectors (difference significant at .10). Output scanning was strongly related to power in Prospector insurance firms and generally unrelated to power in Defenders (difference significant at .05). The particularly strong association ($r = .55$) between output scanning and power in Prospector insurance firms was consistent with the contention that the output task was critical both to the environment and to the firms' strategies.

Hypothesis 4a was supported in the hospitals ($p <.10$) and colleges ($p <.05$) but not in the insurance firms. The particularly strong association ($r = .41$) between the throughput function and power in the Defender hospitals reflected the primary importance of the throughput task they faced.

Hypothesis 4b, on throughput scanning, was supported only in the insurance firms ($p <.10$), although the nonsignificant differences in the colleges and hospitals were in the hypothesized direction.

In sum, the results indicated scattered support for the strategy-power propositions. With some exceptions, coping with the "strategic requirement" was positively related to power. Although this paper has not theorized about the relative effects of the two types of coping (scanning and functional area) on power, it bears noting that scanning appeared to be generally the stronger determinant of power patterns in insurance firms. In the other two industries, the relative strengths of the two power bases were more equivocal. Understandably, the association between hierarchical level and power was strong, regardless of industry or strategy.

DISCUSSION

This study explored how the environment of an organization poses critical contingencies that affect internal power patterns. The hypotheses were generally supported, providing an improved sense of the origins and effects of critical contingencies.

The results suggest that coping with an environmentally imposed contingency is positively related to power. Insurance executives who were in marketing or product development functions and therefore situated to cope with the industry's requirement for product/market innovation had relatively great power within their management teams. Hospital executives who were in accounting, process improvement, or operations, and therefore situated to cope with the industry's requirement for efficiency, had relatively great power. These findings are consistent with those of Lawrence and Lorsch (1967) and Hinings et al. (1974), who also studied linkages among environmental requirements, functional areas, and power.

The study also examined how environmental scanning — a more specific form of coping — related to power under different environmental requirements. The results generally supported the hypotheses. Insurance executives who scanned the critical output sector of the environment had relatively great power, even aside from whatever power they possessed as a result of their hierarchical level and functional areas. Similar patterns were observed for hospital executives who scanned that industry's critical throughput sector.

Thus, coping by being situated in an environmentally critical function was a basis for power, and coping with the environmental requirement by scanning was an additional and separate basis for power. Executives who transcended their functional boundaries to scan critical information apparently bolstered their power. This is a noteworthy finding, since research has documented that considerable cross-functional scanning occurs (Aguilar, 1967; Kefalas and Schoderbek, 1973; Hambrick, 1979).

The results generally supported the theory that an organization's strategy is an additional source of critical contingencies, which, when coped with, yield power. In each industry, coping with the output task (either by functional area or scanning, and sometimes both) was more positively, or less negatively, related to power in Prospectors than in Defenders. Conversely, coping with the throughput task tended to be more positively related to power in Defenders than in Prospectors. I controlled for the different environments by conducting the strategy-power analyses within industries.

A rigorous two-way analysis of the effects of environment and strategy was not attempted, since I was not confident of the cross-industry comparability of the instruments and strategic typing process (see Snow and Hambrick, 1980, for discussion of the inherent relativity of strategy). However, some conclusions can be drawn from the apparent interactions of environment and strategy.

It was expected that organizations pursuing strategies consistent with their environmental requirements would exhibit very pronounced patterns indicating power for executives who coped with the unequivocal contingency. In Defender hospitals, whose environment and strategy both required attention to the throughput task, coping with that task, through both functional area and scanning, was quite strongly related to power. In Prospector insurance firms, whose environment and strategy both required attention to the output task, coping with that task, through scanning at least, was strongly associated with power. These organizations might be considered to be pursuing "mainstream" strategies, strategies consistent with the dominant requirement posed by the environment. In such organizations, power patterns were fairly pronounced.

In organizations whose strategies ran counter to dominant environmental requirements, for example, Defender insurance firms and Prospector hospitals, attention and expertise were diffuse and broadly focused in order to meet conflicting demands. In such "cross-current" organizations, there were more muted power patterns, reflecting the more delicate balance of power that must exist.

The results generally suggested that environment and strategy each act as sources of critical contingencies that can be conceptually and empirically distinguished. In turn, the results supported previous theory which has argued that subunits or individuals will have power in relation to the extent to which they cope with the organization's critical contingencies.

A narrow view of strategy and environment was taken deliberately in order to operationalize the constructs. Strategies other than those in the Miles and Snow typology clearly exist, each with its own strategic requirements. Similarly, an array of dominant environmental requirements exists. Although the limited conceptualizations in this paper have allowed cogent operationalization of two complex constructs, other researchers could take quite different, broader views of them.

Observations Outside the Theory

The results raise some issues that bear discussion, even though they are outside the specific theory that the study sought to test. As expected, hierarchical level was the dominant predictor of power in all three industries. Since hierarchical level in the study was seen as a "crystallization" of earlier power patterns, its effects were isolated. Although it is apparent that hierarchical level largely determines overall power, the extent to which present power affects future hierarchical status is unclear. A useful follow-up would be to trace the promotion patterns of the executives to determine how their subsequent hierarchical advancement is related to their previous power. More generally, it is important to view power in a dynamic context. Although this study was cross-sectional, a temporal model has been set forth in which to view the theory and results. Continuing refinements of such dynamic models of power are needed.

The results indicated two functional areas that were consistently related to power. Involvement in general management was positively related to power, and involvement in external relations was negatively related to power in all three samples, even after controlling for hierarchical level. These pervasive patterns fall outside my theory, but I offer two tentative explanations. Hickson et al. (1971) argued that the "centrality" of a function is a determinant of its power. Accordingly, we could reason that general managers, who typically span and integrate a variety of functions, have high centrality and, hence, high power. And external relations executives, who typically operate at the boundaries of the organization and who are not directly involved in the mainstream tasks, have low centrality and low power.

The second explanation hinges on the methodology of this study which relied on each executive's own interpretation of his or her functional responsibilities. An individual's perception of his responsibilities may reflect some other attribute that affects power. Perhaps the breadth of perspective and integrative attitude of someone who thinks he or she is a general manager may in itself be a basis for power. Conversely, perhaps executives who think of themselves as external relations executives approach their tasks as organizational adornments or appendages and, thus, have lower power. The effects of individuals' role perceptions on their power have not been studied systematically. There may be merit in including this in future studies.

Organizational values typically have not been included in models of intraorganizational power. Although the focus of this study was on differences in the environments of three industries, important differences in their values could have accounted for some of the findings. For example, in the colleges, involvement in the marketing function was negatively related to power. This seems inconsistent with the colleges' need to attract students from a shrinking pool, but it is consistent with a general disdain for a "merchandising" view in liberal arts colleges.

I did not theorize about which of the two different bases for coping, functional area or scanning, is more strongly related to power. On the one hand, it could be argued that scanning is more strongly related to power than functional area, since scanning is an active form of coping, and functional area, as conceived here, is only a situation from which one might cope. On the other hand, it might be argued that functional area is more strongly related to power, since it is a robust variable, which no doubt reflects all forms of coping — information, prevention, and absorption (Hickson et al., 1971). The results of this study suggested equivocality about the two forms of coping. For example, scanning activities, but not functional areas, were related to power in Prospector and Defender insurance firms. This seems curious, since functional classifications were expected to have the least measurement error for the insurance executives. Also, functional boundaries were expected to be relatively rigid in the insurance firms, allowing function to discriminate power patterns. I can offer no explanation as to why scanning dominated function in the insurance firms. Overall, the results indicated some instances in which functions were related to power, some instances in which scanning was related to power, and some instances in which both were. Analysis of these mixed patterns lies outside the scope of this paper, but future research should delve systematically into the nuances of different types of coping behaviors and their linkages to power.

Limitations of the Study

Four limitations of this study are especially notable. First, the study did not include an examination of the power of participants other than upper-level executives. As Crozier (1964) and Perrow (1961) concluded, significant power can reside outside the formal hierarchy. The executive focus was particularly troublesome in the hospitals, since no members of the typically powerful medical staffs were included. This may suggest a partial interpretation of why coping with the output task was not related to power in Prospector hospitals. Since prospecting initiatives often originate with members of the medical staff (Smith and Kaluzny, 1975), this power may particularly overshadow administrators' power in Prospector hospitals. This study must be carefully viewed as an examination of power within top management teams and not as a study of overall power distribution.

A second limitation is the qualitative assessment of the environments of the three industries studied. Although broad, qualitative characterizations of environments seem appropriate in this early stage of research on environment-strategy interactions (Downey and Ireland, 1979), I can offer no proof that the three environments differed systematically as portrayed here. Future research should attempt more refined measures of environmental differences, with awareness of the risk of overspecifying environments along artificial dimensions.

A third limitation is the reliance on the narrow Miles and Snow (1978) typology of strategy. I have defended its use by arguing that it is empirically based and has applicability in an array of industries, unlike other, highly situational views of strategy. Yet other ways of characterizing strategies could be used (see Hambrick, 1980, for a review of primary alternatives for operationalizing the concept of business-level strategy). Future researchers should consider such alternatives, especially multivariate approaches.

Finally, the cross-sectional nature of the study makes it impossible to conclude that environment and strategy lead to power, rather than vice versa. It is reasonable to assume that powerful executives tend to promote their preferred strategies and even that powerful executives in an entire industry can shape the industry's dominant environmental requirement. Longitudinal research on power is needed to disentangle causes and effects.

Environment-Strategy Research

This study has attempted to integrate theory by systematically exploring the interactive effects of environment and strategy on internal aspects of the organization. The study provides support for the contention that environment and strategy can be conceptually and empirically distinguished and that they both can affect internal processes. Although I have focused on the effects of environment and strategy on power, there is need to focus on other internal features as well. Research into how environment and strategy interact to affect structure, communication, control systems, and managerial roles is needed.

I have not directly addressed the question of whether environment is more important than strategy in affecting power patterns. Research on the factors that bear on their relative importance seems important. For example, does strategy tend to dominate in an industry whose products are highly differentiable (cosmetics, magazines), thereby allowing a great deal of strategic latitude? Conversely, does environment dominate in an industry whose products are of a commodity character (mining, steel production)? What other factors might affect the relative importance of these two key constructs?

It would also be useful to address the prescriptive question of what types of alignments among environment, strategy, and internal features are important to organizational performance, and under what conditions. It would be important to know the environmental conditions that will allow an organization to pursue successfully a strategy that falls outside the mainstream of what is generally favored. Future research also needs to distinguish between "intended" strategies and "realized" strategies (Mintzberg, 1978), map the relationship between them, and relate each of them to environment, changes in environment, and internal features.

I have not attempted here an exhaustive or prioritized inventory of available research questions on environment and strategy. I have only attempted to indicate that an important need and opportunity exist to bring together disparate concepts from strategic management and organizational theory. Understanding of how organizations adapt to their environments and operate internally will be significantly advanced if this avenue of research continues.

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APPENDIX A: Process for Classifying Strategies*

College Example

The colleges analyzed for selection included all medium-quality (average freshman SAT scores of 1000 to 1200), medium-sized (1000 to 5000 students) private colleges in Pennsylvania — a total of 29 institutions. Two separate methods were used to classify the colleges according to the Miles and Snow typology. Measures of program additions (Prospecting behavior) over the previous four years were calculated for each of the 29 using data published by the state Office of Higher Education. An expert panel was also asked to categorize the 29 colleges according to the Miles and Snow typology. The panel members were selected for their familiarity with the full array of colleges in the state and included the president of the Pennsylvania Commission for Independent Colleges and Universities, a college president active in the statewide coordination of higher education, three directors of various bureaus of the state's Office of Higher Education, and the institutional research director at a private college in Pennsylvania who had just completed a major study on the offerings of private colleges in the state. The coefficient of concordance of the six panel members was .69 ($p < .01$). There was significant convergence between the measure based on published data and the ratings of the panel (Spearman $r = .56, p < .01$).

Overview of Selection of All Three Samples

	Colleges (N=29)	**Hospitals (N=33)**	**Life Insurance Firms (N=15)**
Initial cohort	1. Pennsylvania 2. private 3. SAT 1000–1200 4. 1000–5000 students	1. greater Pittsburgh 2. private, nonteaching 3. 200–1000 beds	1. headquartered in Pennsylvania 2. assets: \$20M to \$500M 3. *Best's* rating of B+ or above
Source of data on product market additions	*Survey of Educational Programs* (State Office of Education)	*Annual Guide Book* (American Hospital Association)	*Best's Life and Health Review*
Expert panel	1. head of state association of private colleges 2. college president 3. state education officials (3) 4. statewide study director	1. head of regional hospital assn. 2. Blue Cross official 3. hospital administrator 4. HSA official	1. head of Insurance Federation 2. officer, ACLU 3. president of insurance firm 4. professor of insurance
Concordance within panel	.69 ($p < .01$)	.76 ($p < .01$)	.49 ($p < .02$)
Spearman correlation: product/market additions and expert panel ratings	.56 ($p < .01$)	.46 ($p < .01$)	.41 ($p < .05$)
Selected for CEO interviews	4 Prospectors 4 Defenders	3 Prospectors 3 Defenders	3 Prospectors 3 Defenders
Final sample (after interviews)	3 Prospectors 3 Defenders 2 Analyzers	2 Prospectors 3 Defenders 1 Analyzer	3 Prospectors 3 Defenders

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*Detailed information on the measures of product/market additions or on the expert panel questionnaire may be obtained by writing to the author.

APPENDIX B: Questionnaire for Identifying Functional Areas (College Example)

Executive Role

We are interested in learning about your role in the college. Listed below are several typical roles in organizations. Please rank *up to three roles* that seem most similar to your own role in the college (1 = most similar, 2 = next most similar, etc.). * We understand that none of the roles may coincide exactly with your responsibilities, but please do your best to translate them to your situation. If only one or two roles reflect your responsibilities, feel free to only rank one or two. You may find it useful to glance at all eight roles first.

______________	Designing and /or maintaining the accounting system, internal control systems, external reporting systems.	(accounting/finance)
______________	Public relations, fund raising, governmental relations, etc.	(external relations)
______________	Integrating the various functions of the organization; formulating and implementing overall policy; overall goal setting; reporting to the board of trustees.	(general management)
______________	Revenue generation through identifying, evaluating the needs of, and attracting customers/clients.	(marketing)
______________	Designing and implementing policy for employee selection, advancement, personnel records, wage determination, labor relations.	(personnel/industrial relations)
______________	Identifying and implementing new efficiencies in production or delivery of the organization's programs or services.	(process improvement)
______________	Development and evaluation of new programs or services.	(product/service development)
______________	Managing the internal operations of the organization, including utilization of physical resources; material flow; client/customer scheduling, etc.	(operations)

*Each executive's responses were recoded so that his or her involvement in each area could take on any of four ordinal values: 3 (most similar to my responsibilities), 2 (second most similar), 1 (third most similar), or 0 (not ranked).

APPENDIX C: Questionnaire for Measuring College Executives' Scanning Frequency, by Sector

Listed below are 20 types of external events or trends potentially affecting private liberal arts colleges. Please rate* the approximate frequency with which each type of information comes to your attention.

	Environmental Sector**
1. Demographic (e.g., age, race, socio-economic, sex) trends affecting demand (up or down) for any of your college's programs, or other types of programs.	O
2. Advances in course scheduling concepts.	T
3. New approaches to motivating or developing faculty or staff.	A
4. Changes in non-education government regulations, e.g., affirmative action, minimum wage, tax deductions for charitable gifts, etc.	R
5. Shifts in societal values, cultural beliefs, or attitudes affecting demand (up or down) for any of your college's programs or other types of programs.	O
6. New ways of managing expenses for utilities and physical plant maintenance.	T
7. New approaches to planning systems.	A
8. Changes in accreditation requirements/interpretations.	R
9. Major changes in programs offered by comparable or competitive colleges.	O
10. New cash management techniques.	T
11. New approaches to budgeting systems.	A
12. Changes in governmental financial aid criteria.	R
13. Enrollment levels and patterns of comparable or competitive colleges.	O
14. Efficiency statistics (e.g., costs per FTE student, cost per meal served, etc.) for comparable or competitive colleges.	T
15. New approaches to organizational design.	A
16. Court rulings involving institutions of higher education.	R
17. Possible joint ventures or cooperative/consortium arrangements with other institutions, where the intended benefit from cooperation is enhanced curriculum breadth or increased student body size.	O
18. Possible joint ventures or cooperative/consortia arrangements with other institutions, where the intended benefit from cooperation increased efficiency or cost sharing.	T
19. New approaches to improved internal communication.	A
20. State coordinating commission actions.	R

*a 7-point interval scale was used: once a year or less . . . to . . . once a day or more.

**O = Output
T = Throughput
A = Administrative
R = Regulatory

APPENDIX D: Questionnaire for Measuring College Executives' Scanning Time Allocations

Every executive spends time — formally or informally — learning about factors external to the college. How do you divide your time learning about external events or trends of potential significance to the college? Please allocate 100% across the following categories. You may find it useful to glance at all the categories first.

a. Information about *MARKET TRENDS,* such as enrollment patterns, new program or market opportunities, threats to existing programs, demographic trends, manpower projections, attitude/value trends, enrollment trends of other colleges, etc. ______ %

b. Information about trends, concepts or techniques that could affect college *EFFICIENCY,* such as new computerization techniques, scheduling concepts, purchasing arrangements, energy cost control methods, financial management techniques, etc. ______ %

c. Information about trends, concepts, or techniques bearing on organizational or *ADMINISTRATIVE* arrangements, such as new approaches to faculty or staff development, planning/budgeting techniques, organizational design concepts, internal communication systems, etc. ______ %

d. Information of a *REGULATORY* nature (coordinating body actions, accreditation, governmental trends on higher education, affirmative action rulings, labor relations rulings, legal actions, etc.) ______ %

e. Other (please specify) ______________________________ ______ %

______ 100%

APPENDIX E: Questionnaire for Measuring Power (College Example)

Decision Roles

Below is a list of administrators and their titles at ________ College. Please indicate the amount of influence each of these people generally has in affecting the outcomes of each of the types of decisions indicated below.

Use this key in responding:

no influence			moderate influence			total influence
1	2	3	4	5	6	7

	Decision I major capital expenditure decisions (a new building, major renovations, etc.)	**Decision II** adding or dropping major programs, curricula, services	**Decision III** annual operating budget allocations	**Decision IV** organizational redesign (changes in reporting relationships, committee structures, etc.)
K. Benson (President)	______	______	______	______
R. Chase (Dean of College)	______	______	______	______
C. Evans (Vice President for College Relations and Development)	______	______	______	______
J. Fay (Vice President for Finance and Treasurer)	______	______	______	______
H. Kendall (Dean of Students)	______	______	______	______
D. Noble (Vice President for Physical Planning and Operations)	______	______	______	______
G. Saunder (Provost and Dean of Faculty)	______	______	______	______
P. Smith (Assistant to the President)	______	______	______	______

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News and Notes

FROM THE EDITOR

At the 1980 meeting of the editorial board in Detroit, the editor was urged to share information about the editorial process at *ASQ* more widely. Usually such information goes to the editorial board and whomever else persistently buttonholes board members. This casual distribution lends itself to rumor, puzzlement, and occasional inaccuracy. To reduce some of the suspense associated with submitting work to *ASQ,* we plan to provide a variety of items in the next several issues. We plan, for example, to publish a set of guidelines for authors, a new policy inviting letters to the editor, and statistics summarizing turnaround times at various stages of the editorial process.

This issue contains two items intended to be more explicit about the workings of *ASQ.* First, a statement of policy concerning commentary on book reviews has been included in the Book Review section. Second, in response to numerous requests for a "realistic job preview" of what a person can expect when submitting a manuscript to *ASQ,* we are publishing Gerald Salancik's version of crucial mechanics, sentiments, and assumptions associated with how we process writing that is sent to us. People who work with *ASQ* are in essential agreement with the points Jerry raises. While there may be departures at minor points due to differences in taste, the process coheres and unfolds just about the way Jerry says it does.

Adaptation of Gerald Salancik's Comments for "Journal Editors' Panel" of The Annual Meeting of the Academy of Management, Detroit, August 1980

Gerald Salancik: *ASQ* is considered to be more a scholarly journal than a practitioners' journal, a general social science journal with emphasis on organizational behavior and organizational theory. I don't think I can articulate a philosophy for the journal, and I certainly don't want to take responsibility for articulating the editor Karl Weick's philosophy. Instead, I will describe how *ASQ* proceeds, from which one can infer a philosophy and a set of beliefs.

The logistics of *ASQ* are very simple, but all decision making is affected by these logistics. Basically, an article or a manuscript is submitted to the journal and the managing editor passes it on to the editor, Karl Weick. He reads it at that point, as he does every one of the 200 to 300 manuscripts received each year, and decides whether to send it out for review or send it back to the author usually with a specific commentary as to what he sees as the problem with the manuscript and then usually a closing line that says something to that effect: "I don't view this as appropriate. Perhaps I have missed something. If you want to get back to me, please do."

If he sends it out for review, he decides which of the associate editors (there are two associate editors, myself and Howard Aldrich) should receive this particular manuscript. I don't have any great insight into how he makes that judgment, except that it is most likely on the basis of his assumptions about our relevant expertises. Howard is a sociologist who tends toward what is called macro-organizational analysis. I'm a social psychologist, and Karl tends to send me more on human behavior aspects of organizations.

Once the associate editor receives a manuscript, it is his responsibility to assign five reviewers. In my case, I have a large file of reviewers that I have generated by asking past *ASQ* authors, subscribers, or reviewers to tell me what they would like to review for us. I have these topic areas written on cards. In addition, I asked each individual to tell me of other individuals who would be appropriate for reviewing manuscripts. So I have about 200 names in my files. From that 200 and from two other sources, I somehow generate a set of five reviewers. One thing I do is read the manuscript, very briefly, because at this point it is not useful for me to read it carefully. I look at the reference list and make a judgment as to the paper's domain, its content and conceptual domain. If there are some people referenced that I know to be particularly relevant for the manuscript, I simply pull those names from the reference list. In addition, I try to develop reviewers and writers for the future. So I tend to assign the manuscript to a younger reviewer who hasn't had a lot of experience reviewing but who is capable and relevant for this content area. That name comes from my files. In addition, I then assign it to editorial board members. The journal has about thirty editorial board members who are appointed on an annual basis to the journal and who promise us their time to review manuscripts. These reviewers are chosen for their commitment to the journal. They are often past authors and have been groomed and tested as outside reviewers first. They are willing to invest the time when asked. Outside reviewers may not be willing to invest the time each time they are offered a manuscript for review.

The five reviewer assignments are communicated to the managing editor by phone and follow-up letter. Three of the five are selected as primary reviewers, and two are alternates. Who actually reviews the manuscript, however, depends on random and seasonal difficulties of getting people to review the manuscript. Academic breaks are more problematic times. Most people write then, so we get many manuscripts and fewer people willing to review. We send out the manuscript to three primary reviewers. On the average about one of them says, "I can't do it now. Thank you, but no thank you." The managing editor then selects one of the alternates and sends the manuscript out again. The reviews are all returned to *ASQ*, usually within 45 days, with copies to me.

Three reviews is an unusual number. Few journals use that many. Most use two. *Science* uses up to six, and three as a norm. The reason for three reviews is the nature of the content of *ASQ*. It is very diverse, very ambiguous. It requires different eyes looking at it, which of course further enhances the ambiguity.

It becomes the associate editor's job to disentangle the ambiguity. I take the reviews, read them very briefly at that point, and then I read the manuscript, and that usually takes me six to eight hours. And I read it in detail. My background, in addition to psychology, is in journalism. I read the manuscript in explicit detail. I question every single sentence. I carefully try to get an understanding of the manuscript. And then I look at the reviews to see what they say about it, what points they are picking up. And I look for the consensus among the reviewers about the points, or I look for points that are raised by one reviewer, on the assumption that all of us have difficulty making judgments and one person will hit on one thing and another person will hit on another. I then try to compose all this ambiguity into an articulated decision first and then a letter.

There are three kinds of decisions. One is an outright reject. That happens, I guess, in my experience, about 75 percent of the time. The next category is a revise and resubmit. We now have a policy at *ASQ* that a person is given an opportunity to make one revision. At that point the editors have to make a final decision. And the reason for this policy is to avoid stringing along authors in a very laborious and costly personal process.

In writing a decision letter, there are three things that I add to the editorial process. One is my judgment. I make two kinds of judgments. One is about the nature of the topic and its appeal to our readership. An editor's real job is to serve the readership and not the authors. What I look for are topics, articles, or just thoughts that would appeal to the kind of readership that *ASQ* attracts or will build. The second judgment I make has to do with the quality of the thought, its expression. If you can't say what you mean then it doesn't much matter that you mean it, because nobody else is going to be able to understand it and benefit from it.

Second, I review the reviewers. The reviewers often do not articulate carefully what they see as a problem with the manuscript. Part of my job is to invent a rationale for what they see as the problem. And if I can't figure out what they are seeing as a problem, that is, if I disagree, I simply dismiss their judgment on that occasion, and say so. I say, "The reviewer thinks this is a problem. I can't see that it is a problem." In addition, I will point out problems that I think the reviewers have missed, again on the assumption that all of us are limited and sincere human beings and that we can make mistakes and may not see things.

My next task is to evaluate and articulate. I attempt to articulate, usually in a long-winded way, what to do with the manuscript. If the judgment has been made that there is something in it of value to our readership, there are no overwhelmingly severe problems with it such that the whole study — usually it is an empirical study — is invalidated because of logic, methodological problems, or whatever, I assume that the problem then is one of presentation. I rely on my own background in journalism to attempt to articulate how to present this material.

Now, in undertaking that task, one constantly straddles the fence between being the creator and being the reviewer, being an editor and being an author. I don't know how familiar you all are with editing as a business, but editors can be as important as their authors. Anyway, I try to articulate what I think can be done on a very operational level. I have even suggested such things as, "Sit down with this manuscript and take a scissors and cut out the pieces you like; mount them, put them in a pile. Take the rest, throw it away. Work from the pile that you have cut apart and rewrite it." A final thing that I contribute in evaluating and articulating is that I make explicit what *ASQ* is or is not willing to commit itself to at this point. If it is for a revision, I simply say, "At this point I think you have enough here that eventually something will come out of it," if I truly believe that. I don't make such judgments lightly. Or I say, "My guess is that nothing will come out of this unless you are really able to articulate this in some way. I can't make a judgment on that yet, because I don't know enough about you or your capabilities in writing and presenting." *ASQ* material is very complicated, so writing is a critical issue.

The third thing I do as an editor is to be a gentleman. This, for me, is a very important role, primarily because of my own experience, since the age of 15 as an author, during which time I have accumulated over five hundred rejections for all kinds of material. I try to maintain a little dignity and humanity in the reviewing process. Reviewers once in a while will write, and I have myself written as a reviewer, very scatological comments — often without a lot of intent, often thoughtlessly, just out of a sense of frustration. Some reviewers report that they spend eight hours with a manuscript. That can get very frustrating. What I do is to try to bring a little humanity back into the process, recognizing that what is on the other end of a decision letter, at the other end of a manuscript, is another human being who lives in a human world and who is not going to be told easily, "I don't like what you think. I don't like what you say, and I don't like what you write." The other day, somebody told me that I had essentially said, "This is very badly written." The person to whom I had said this is a former journalist who was very offended by my statement. The comment was unfortunate, as it took this person some two or three months to unwind from it.

The next thing that happens in the editorial process is that the author turns in a revision. The whole process, in essence, starts over again. The revision is sent to three reviewers, new judgments are made on the paper, and the editor makes a final decision. If a manuscript is accepted for publication, then the third process starts, the process of editing by the copy editor.

The result of this review process is easy to quantify and hard to qualify. An accepted manuscript will have had about 25 to 30 editorial hours of fine independent minds offering advice and many additional hours of careful copy editing. However, because we work through the mails, the whole process takes, on the average, about 90 to 100 days.

Audience: What do editors do with revisions resubmitted to a journal?

G.S.: In some cases, send it back to the original reviewers. However, there are certain cases under which the reviewers may no longer be appropriate. That is, it may have been that what was uncovered in the review process was some kind of severe statistical question that requires a different kind of expertise. But remember we are talking about human beings here. The reviewers quickly develop a sense of ownership and responsibility for the manuscripts that is very important to us. So, in addition to worrying about the humanity of the author, we always have to worry about dealing with our reviewers as if they were human.

Audience: When you review again, do you do it the same way you did it the first time, or is it handled with special care, special preference?

G.S.: You mean in terms of the logistics of it? Well, the logistics are the same. That is, the revised manuscript comes in — if it comes in. Now that is a decision that the author has to make. In some cases it is explicitly stated that the author has to decide whether it is worth the investment of his time to revise, whether he thinks that it is going to work at this point or not. All I can tell him is what I believe. Assuming the author has done that and sent in a revision, it is handled logistically as if it were a new manuscript. It comes in the mail to me. I look at it, realize it is a revision, because it is said to be, and then judge whether to send it to the original three reviewers or add a new one. It depends on how finished the product is and whether the problems if there were any (in some cases there are no problems), were resolved or not. Depending on what judgment is made at that point, the process starts over.

If it goes back to the three reviewers, again we wait perhaps two months for the reviews to come in, and then I sit down again and read the new manuscript. In my own personal style, I have an enormous ability to compartmentalize and to forget things, so I have no memory of the former manuscript. I read it as if it were a new manuscript, because that is how readers are going to read it. They are not going to have gone through this history, and so the history is irrelevant. The reviewers will usually key on points that they raised in the initial manuscripts, but in the process of rewriting, new points may also arise. I deal with their reviews in the same way as before. What are they saying? Does it make sense? Is there evidence for what they are saying? If yes, then let's see if there is anything we can do. If there is nothing that we can do, make a decision to accept or reject.

Part of what I add to a decision letter is an evaluation of how important the reviewer's point is. I think, from an author's point of view, that any time anybody says something about your manuscript you give equal weight to everything they say, and that is a big mistake. You should take as your task as an author to receive somebody else's comments as nothing more than what they are. Somebody else said this about what I did. And you should not be concerned about rejecting what they say, about arguing back, about pointing out, "My God, your logic here is just bizarre." Now, unfortunately, many authors don't do that, and I have to do a lot of it as an editor so that they are not overwhelmed by the reviewers.

Chairperson: One thing that may not be clear is Karl Weick's role.

G.S.: *ASQ* is a slightly different journal. It is owned by Cornell University. The editor, Karl Weick, is paid by Cornell University, and the editor has responsibility for *everything* that goes on in the journal. Now every time that I have done something, every time a reviewer has done something, Karl Weick reads it, makes comments on it. He comments on each decision letter; pulls them out if he thinks that they are not appropriate, thinks that they are wrong; states his case. I argue back and am either convinced or fail to be convinced by his arguments. But ultimately, the editor is responsible and is the one who has to be held accountable. There always has to be one person who can't shift responsibility. So I will quickly shift my responsibility to where it belongs, which is to him.

Audience: Do you send articles with the authors' names on them to reviewers?

G.S.: No. *ASQ* uses what is called blind reviewing. That is, the reviewers do not know who the authors are. Simultaneously, the authors do not know who the reviewers are. The editor knows who everybody is.

CITING

Philip Runkel (University of Oregon) recently caught the editor committing an act which the editor himself finds infuriating when committed by others, specifically, "citing authors so laconically or cryptically that the reader becomes enraged at being treated so cavalierly." To drive home his point, Runkel enclosed a brief discussion on proper form and courtesy when citing others. The piece made such good sense that the editor asked Runkel for permission to reproduce it. He agreed, and here it is, taken from the manuscript of a book Philip J. Runkel is co-authoring with Margaret Runkel, titled "A Brief Dictionary of American Usage for Scholars and Students in the Social Sciences and Education" (pp. 27–29):

It is customary in scholarly writing to cite the work of other authors. Some writers may do that just to show how many books they have read, but there is also a more serious reason to do it: to tell readers where they can get more information on the topic you are writing about. You might cite another author to show readers that you are not the only one holding an opinion you have stated — that someone else agrees with you. You might cite a source of empirical data to back up a factual statement you have made. You might cite a review of literature that can round out the readers' appreciation of the scope of a topic. You might point readers to a more detailed discussion of a topic you merely touch on. You might point readers to a mathematical derivation of a formula you use. And so on.

Many writers, unfortunately, leave us guessing. Some of us readers will want to pursue further information of a certain kind, but we cannot decide whether to pursue it until we know the kind of information that is in the article or book the author has cited. Here is an actual example of the kind of citation that infuriates us:

> She drew on their respect to maintain control, sometimes in directive ways, sometimes in ways that drew out and developed the controls from within (Redl and Wineman, 1952) the children.

Why should we get Redl and Wineman off the library shelf? What information will we find in the book? Do Redl and Wineman tell how to draw out and develop controls from within? Do they give the theory about controls from within? Do they contrast directive ways and drawing-out ways? Did they invent the phrase "controls from within" — is the author of the sentence merely giving credit to Redl and Wineman? Or do they perhaps tell more about that particular teacher? Or about similar teachers? We may be interested in one of those questions and not others. We cannot judge whether to go to the trouble of getting the book from the library unless we know to what kind of further information the author is pointing us.

No reader is going to dig up every reference you cite on the chance that it might be interesting. If you hope your readers will care enough about your subject so that they will want to read more about it, do them the courtesy of telling them the kind of information they can find. Here are some examples of ways you might do it:

> Redl and Wineman (1952, pp. 263–275) describe in detail the method of drawing out controls from within.
>
> . . . (the phrase is from Redl and Wineman, 1952, p. 17).
>
> For another example, see Redl and Wineman (1952, pp. 78–84).
>
> Redl and Wineman (1952) review the literature.

> . . . (Redl and Wineman, 1952, Chapter 7, give empirical data . . .).
>
> Redl and Wineman (1952, p. 19) make the same point.

Notice that we included page numbers in our examples. It is maddening to be told that there is a valuable piece of information someplace in a 600-page book.

Give in to your self-respect. Take it for granted that at least some of your readers will be captivated by what you write and will *want* to know more about it. Then be considerate of them. Tell them the kind of information they will find and the page they will find it on.

M.I.T. SUMMER PROGRAMS

The Massachusetts Institute of Technology is offering two summer programs on decision analysis under the direction of Professor Alvin W. Drake and Dr. Ralph L. Keeney. The first, entitled "Decision Analysis: Basic Concepts and Applications," scheduled for August 10–14, 1981, is intended to provide a critical understanding and working knowledge of the fundamentals of decision analysis. The program includes lecture, problem, and discussion sessions and is planned as a self-contained, highly interactive introduction to the model, concepts, and practical methodology of decision analysis. The second program, "Decision Analysis with Multiple Objectives: Concepts and Applications," which is scheduled for August 17-21, 1981, assumes a general knowledge of elementary decision analysis. It will explore current concepts and methodologies for decision problems in which the desirability of outcomes depends on their achievement of multiple objectives. The program emphasizes the use of qualitative features of preference structures to assist in the determination of utility functions; there will be detailed presentation and discussion of several case histories, with attention to interactions between analysts and decision makers. For further information on the programs, contact Director of the Summer Session, Room E19–356, Massachusetts Institute of Technology, Cambridge, MA 02139.

ERRATUM

On page 635 of "The Evolution of Organization Analysis in *ASQ*, 1959–1979" by Richard L. Daft (December 1980: 623–636), the reference to Ouchi and Dowling (1974) should read:

Ouchi, William G., and John B. Dowling.

BOOK REVIEW REBUTTAL POLICY

Book reviews are judgments of the individual reviewer. Unlike the evaluation of articles, an objective consensus is impossible to achieve. By submitting a book for review the author and the publisher thus risk the possibility that a particular reviewer will be negative in his or her evaluation of the volume. It is the option of a book's author to ask the journal not to have his or her book reviewed. The responsibility of the journal is 1) to assure that an appropriate reviewer is selected; 2) to assure that in the critique the reviewer deals directly with the book; and 3) to assure that a critique is written within the parameters of good taste and does not reduce itself to sarcastic witticisms. I should note that at times we may fail in regards to each of our three responsibilities. At times the reviewer may not have been the best choice. In rare instances we have published reviews that only superficially deal with the substance and, in even rarer instances, we have failed to catch inappropriate one-liners. For the most part, however, we have attempted to adhere to our three primary objectives.

The primary source of frustration for many authors are those instances in which the reviewer makes specific misinterpretations of facts. This often occurs because the quantity of books is such that the book review editor does not have the time to read each volume from cover to cover. A second source of frustration for authors are those instances in which a reviewer is critiquing a volume from a theoretical perspective that is at odds with the perspective presented in the book. This is especially troublesome when the reviewer does not explicitly point out this difference in perspective. Because such incidents occur or have occurred on very rare occasions, in the future *ASQ* will entertain letters of rebuttal from authors when they can demonstrate that the reviewer has either made factual mistakes or has failed to point out his or her own unique orientation. The decision of whether or not to publish such letters will be made jointly by the editor and the book review editor. Such letters will only be published when the case for rebuttal is dramatically clear.

Samuel B. Bacharach
Book Review Editor

Karl E. Weick
Editor

Who Gets Ahead? The Determinants of Economic Success in America.

Christopher Jencks, Susan Bartlett, and Associates. New York: Basic Books, 1979. 397 pp. $17.50.

Who Gets Ahead is a sequel to Jencks and company's highly influential study, *Inequality*, published almost a decade ago. The first book expressed skepticism over the extent to which inequality in income and occupational status could be explained by family background, cognitive skill, or schooling and questioned the effectiveness of educational policy in reducing social inequality. These findings provoked a continuing controversy. *Who Gets Ahead* is an attempt to bring new evidence to support the first book's premises with more objective, and extensive, empirical research.

While the book succeeds in achieving that goal, it presents few new issues or results that were not in the first book. It does serve as a useful statistical appendix to the first book, however, providing additional ammunition for the earlier book's conclusions.

The difference in the approaches of the two books is evident in their titles. Where *Inequality*, written in an often provocative and normative style, is broadly critical of society and existing social reform, *Who Gets Ahead* concentrates on the individual, shying away from generalizations of society or policy, and is written in almost clinical fashion.

The reader will not find a bold critique of society, nor even suggestions for reform, but, instead, one of the most careful and comprehensive studies of the determination of individual economic success. Perhaps fearing the controversy created by their earlier effort, the authors made sure at every step to explain their assumptions and qualify their conclusions. They may have gone too far, however, for it is often difficult to pin down specific results and conclusions.

The topic of this research is perhaps the most well-traveled junction between economics and sociology. While understanding the determinants of economic and social status is crucial to these two disciplines, it also has great implications for politics and policy. The problem with the topic is that researchers face strict competition from other researchers armed with more powerful statistical technology and improved data. The authors of *Who Gets Ahead* are striving to keep two constituencies happy, attempting to satisfy academic colleagues with their rigor and to report their results to a general audience. The compromise satisfies neither group completely.

The primary attraction of this book is its massive attempt to increase the reliability of the measurement of the determinants of economic success. The authors mobilized a large group of researchers, eleven large data sets, and over $400,000 in research grants to address this issue. The most innovative feature of the book is the comparison of many different surveys for the measurement of the same parameters. Most previous studies have relied on one or perhaps two sets of data; here the researchers use five commonly used sources and six more specialized ones. While it is confusing at times to keep straight all the features of the different data sets, and even harder to remember the permutation of results, this diversity provides the basis for a healthy skepticism that is not often found in empirical research. These researchers take great care in distinguishing the variables' definitions in each source and in comparing their methods of selection and coverage.

After a brief introduction, the book is organized in a series of chapters that supposedly can be read in any order. The difficulty with that format is that it puts too much stress on the introductory and summary chapters to sell the contribution, results, and perspectives. I don't feel that enough effort was made to highlight the significance of the research, and readers are forced to organize the results and search for meaning themselves.

In order to make a book with a fair amount of statistical inferences and language accessible to the general reader, the authors have included a clearly written chapter on statistical methodology (Chapter 2). In some sense, this chapter is insufficient to train the statistical novice and is unnecessary for anyone with training. It would have made more sense to have integrated explanations in the text where needed and to have relegated more of the technical explanation to footnotes. This was done quite well in *Inequality*.

There are chapters for each of the important determinants of economic success — family background, academic ability, non-cognitive traits, education, and race — mirroring the structure of *Inequality*. The study of family background uses the increasingly popular technique of comparing brothers. Since brothers share the same family background and at least some of the same genes, it might be expected that if family background is an important determinant of success, then the economic status of brothers would be strongly related. This technique has the advantage of allowing the researcher to discover the effect of unmeasured family characteristics as well as measurable ones. It is found that almost half of the variance in occupational status is explained by family background. The disadvantage of the method, however, is that it becomes difficult to separate out the different possible explanations for the effect of family background. Differences could be due to hereditary influence, environmental influence, or the influence of one brother on another's success.

While *Inequality* downplayed the role of cognitive ability in explaining differences in earnings, *Who Gets Ahead* places a new emphasis on this factor's importance. The authors find that the impact of cognitive ability on earnings increases with age and is still important after controlling for family background. The mechanism for the transmission of ability to earnings is largely through educational attainment, since more able individuals are likely to obtain more education. Although ability affects earnings, this explanation of earning differences is still relatively minor, bringing into question whether the United States can be characterized as a meritocracy.

Chapter 5 concentrates on the role that an individual's personality or non-cognitive traits play in his or her chance of succeeding. While the authors find many interesting relationships between particular personality traits and success, the lack of a causal model, determining an individual's attitudes and traits along with the propensity to succeed, limits their power and application. They run into the familiar social science problem of whether attitudes are a cause of behavior or merely an effect of it. Individuals who succeed are likely to have different attitudes than those destined for failure, and it becomes difficult to make sense of the interaction of the variety of non-cognitive traits. The authors do show that personality is not a mere reflection of unmeasured family background traits, but they cannot isolate whether personality has an independent effect on earnings. Clearly, a more sophisticated model could settle some of these issues.

Chapter 6 investigates the much-discussed subject of the impact of education on earnings. Though the authors reproduce many results of previous papers, there is very little new here to report. They reiterate the suggestion, first offered in *Inequality*, that the equalization of education will have a small effect on income inequality and the alleviation of poverty, because education has a relatively small effect on earnings. When other things are held constant, high-school dropouts suffer poor earnings mainly because of associated family and ability traits rather than just because of a lack of education. Since education is the only characteristic in the authors' study that is readily malleable by policy, *Who Gets Ahead* provides few encouraging remarks on how social inequality can be eliminated.

The next chapter also explores a popular issue: that of the effect of race on earnings. Much of the research duplicates previous findings on the differences in the rate of return for blacks and for whites and the recent reduction in these differences. The authors' discussion of how the differences in earnings among blacks and whites could be due to either unmeasured productivity differences or discrimination is well done but not very original. It seems that with the wealth of data, new ground could have been broken on this old subject.

Much of the work of these chapters retraces that of *Inequality*, with very few surprises. In the later part of the book, the authors do approach a question of great interest and significance: Why do researchers asking similar questions, often with the same data set, come to such widely differing conclusions? Jencks and his co-authors analyze the impact of differences among data sets and differences in research style. They take the relationship between education and earnings and compare results from the use of the 1970 Census with those from the Panel Study of Income Dynamics of the same year. They pay close attention to methodological differences in the creation of the samples, sampling errors, and possible explanations of the remaining differences in the results. An interesting aspect of this investigation is the authors' ability to create different conclusions simply by using different data sets, different definitions of income, and different treatments of unusual cases. By illustrating the process of "data mining," they provide important insights into how important this aspect of empirical research can be in explaining disparate findings. They argue that the standardization of method is necessary both for the collectors of data and for researchers. The two chapters devoted to research methodology are a valuable start in the reform of standard operating procedure in quantitative social science.

Although the reader of *Who Gets Ahead* can only be amazed by the amount of work that went into it, there are several deficiencies that reduce the value of the product. Foremost is the lack of a unifying theoretical structure in the analysis to give the many empirical results interpretation and meaning. The reader is forced to assess, unassisted, the importance of a particular fact for social science and policy. Not only does this flaw inconvenience the reader, it also prevents the book from addressing some interesting questions. While the importance of the different components in the explanation of economic success — family background, ability, and education — is assessed the mechanism by which these elements interact is glossed over. This creates difficulties in the interpretation of the results as causal effects and not mere correlations. Important policy issues such as the effect of the equalization of educational opportunity or compensation of the poor cannot then be easily investigated.

The authors hint at a theory only in the concluding pages, in a discussion of the role of "luck" in determining success. *Inequality* had presented the controversial interpretation that the residual variation is basically the effect of chance. Economists were quick to reply that the residual variation may represent instead unmeasured personal characteristics and not any indeterminacy in the wage. In *Who Gets Ahead*, the authors resurrect the role of chance by appeal to the possible existence of imperfections and structural rigidities in the workings of the labor market. While this issue is quite interesting and should have been developed in more detail, little new evidence is presented here.

Although many readers who pick up *Who Gets Ahead* expecting a book of the scale of *Inequality* in its provocativeness and impact will be disappointed, they will find *Who Gets Ahead* a more scholarly and careful study. *Who Gets Ahead* will not make headlines, but it is likely to make a more permanent contribution to the stock of knowledge on the determination of economic success and social status.

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The Politics of Organizational Change

Iain Mangham. London: Associated Business Press, 1979; Westport, CT.: Greenwood Press, 1980. 221 pp. $23.95.

The crisis in organizational analysis to which J. Kenneth Benson directed his editor's introduction in the now well known special issue of *Sociological Quarterly* (1977) has not gone away. Wrapping up the loose ends of organizational theorizing, Perrow (1979) speculates on the possibility that "ethno-Marxism," a deliberately provoking neologism that collects the various elements of this "crisis," will constitute the major trend in the immediate future. Responding to Mangham's volume and its earlier (1978) companion as evidence that the future is now would be somewhat premature; but they do suggest that elements of the crisis are already influencing thinking and research in organizational development. *The Politics of Organizational Change* is only part of the synthetic and applied work that is going on within the Centre for the Study of Organizational Change and Development in the School of Management at the University of Bath, England. Yet, in this book the concerns for individual cognitive perspectives, for political interaction among individuals with differing viewpoints as the basis for organizational life, for the organizational consultant as one viewpoint and one political figure among many capture both the diversity of the Centre's work and the hard-nosed, reflexive character of its action research.

With these opening remarks, I want to claim that the deceptively modest little volume under review, intended to be read mainly by managers at all levels and in all kinds of organizations, is deserving of a broader intellectual context and larger reading public than it indicates. As the most accessible, synthetic product of the Centre, where Iain Mangham is Director, this book introduces people involved with organizational development to the work of an interesting British group of academic practitioners. At the same time, the micro-political approach to organizational life weaves and develops themes that are dear to the heart of symbolic interactionists. Finally, the direct, lucid style of the volume will attract and retain the attention of undergraduate and graduate students with concrete interests in organizational analysis, development, and change.

This is a consciously discursive volume; but any reviewer worth his salt could find detectable sections around which to organize some comments. Mangham begins with a swift and over-digested review of some major perspectives on organizations. He evaluates classical, human relations, and systems approaches as partial and inadequate against a practical standard — they fail to provide realistic guides to taking action within organizations because they depend on either deterministic metaphors or elegiac models of humans and their relationships. With this critique in hand, he introduces a preference for a micro-political approach. The three major sections of the volume, then, allow him first, to specify the self-reflective character of human persons and the symbolic interaction that constitutes their relationships in organizations and elsewhere; second and uniquely, to blend this interactionist viewpoint with a micro-political approach that leans lightly on the "negotiated order" theorists (see, for example, Strauss, 1978); and finally, to illustrate from his own action research how processes of organizational change may be encouraged, guided, and sustained within limits.

The first section is quite straightforward. Without over-documentation and generally from Blumer's position (especially, 1969), Mangham sketches an image of the human as a creative, symboling process engaged in interpretive interaction with self, environment, and others. A variety of illustrations drawn from his own research gives clear, graceful life to a number of interactionist concepts, including "meaning," "self," "interpretation," "roles," and "scripts." Then, he takes the concept of "interaction" to organize a discussion of how persons in organizations pursue their goals by means of tentative definitions of situations, which include agreements on the nature of self and alter and any other dimensions of reality required for joint action.

In the second section, considerations of the creative aspects of interaction are tempered and chastened by a corrective emphasis on the routines that make up most organizational conduct. Mangham is willing to regard organizations as networks of joint action that have emerged from mutual accommodations and range from the constantly innovative to the completely routine. Of course the initial process of making such accommodations will be creative; but a continuation of the encounters in which these agreements provide acceptable and predictable outcomes will rapidly stabilize and routinize them. Hence, the joint action which makes up the organization can be treated as a "negotiated order" that is variously constructed and reaffirmed on a daily basis. The politics of organizations, for Mangham then, are the processes through which particular definitions of self, other, and situation are imposed and negotiated.

Many factors are involved in these micro-political endeavors, and this author tries to offer only a suggestive outline of what he considers the most important. However, he does clearly recognize that the most crucial factor is power. He treats this concept rather loosely, touching a number of theoretical positions along the way; but he is willing to regard power as including both naked force and the control of various resources, including rewards, sanctions, expertise, and information. He collects these notions by interpreting power as "getting others to accept your view and perspective on events and situations" (Overington, 1979: 99). As a researcher in organizational change, Mangham is more interested in situations where control of power resources is distributed than where there is one-sided dictation of bosses (for all that he believes the latter to be more common than many practitioners of his trade would want to admit). Thus, after giving due weight to the stubborn character of routine scripts and the persistence of stabilized agreements, he turns his attention in the third section to the possibilities for organizational change under conditions of shared power and to the part that action researchers can take, using the point of view that he develops in this volume.

Mangham believes that the fundamental condition for change is a recognition that it is possible. We have to separate ourselves from the routine scripts in which we are involved, and for this he advocates something like a Brechtian *verfremdungs*, in order to grasp alternative possibilities for action. However, translating such possibilities into some goal that is mutually, rather than merely personally desirable, requires skills in negotiating new agreements. These necessarily involve agreements on both the character of the situation and the selves that are involved. Change under conditions of shared power, therefore, turns around a variety of skills that are involved in persuasive negotiation. Can individuals be trained in such skills? Mangham's answer is a qualified "yes, but." He has been the T-group route (1973) and is disinclined to advocate such a strategy unless the training situation can be made more like everyday life in organizations, i.e., unless the important dimensions of micro-politics can be explicitly worked on and with. Too much work in the human relations tradition stresses "cooperation and collaboration and chooses to ignore . . . man's evident capacity, and occasional ardent desire, to screw his fellow man . . . " (Mangham, 1979: 15). At the same time, because organizational politics are an affair of individuals in groups, it is groups that should be the focus of training for effective negotiation.

In these final chapters of his book, Mangham shows us how the perspective developed in the first two sections can inform such group training and discusses his own interventions as a consultant in real-life group interaction at a senior corporate level. All parties, including the consultant, have self interests to pursue in these groups; Mangham's perspective suggests that if these groups are to be made more effective, individuals must be led to an accurate grasp of the various definitions of self and situation that they bring with them. From there, it is sometimes possible to negotiate a joint agreement that is genuinely acceptable to all. This can be best accomplished if each individual in the group understands and becomes skilled in the micropolitical maneuvers that constitute group interaction in decision-making contexts. One could sum up his approach, in all its hard-boiled directness, from his comments on a merger that he uses as an extended illustration: "Throughout the meeting there remained an appropriately *low* level of trust . . . " (p. 214).

I find this book attractive. Its wry, simple style betrays an obvious understanding of a literature far broader than footnotes and references indicate. In a peculiar way, this inspires a confidence in Mangham's theoretical insights and research capacity out of proportion with the volume's stated objectives. I would want to hire him as a consultant for anything that he would do; I am sure that his intended public among managers will feel the same. However, I have insisted that we can read this volume in a broader context, and we can; but, in so doing, one must be aware that this is work in progress. A number of theoretical hats could be knit from the loose ends. As an academic sociologist with great sympathies for the micropolitical approach that is offered in this book, I hope that Mangham can be persuaded to take time off from action research to do some armchair work. Meantime, I shall keep my head as warm as I can with what he offers here.

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Contested Terrain: The Transformation of The Workplace In The Twentieth Century.

Richard Edwards. New York: Basic Books, 1979. 261 pp. $12.95.

In *Contested Terrain*, Richard Edwards presents a provocative, historical study of the evolution of control systems in American business in the course of the twentieth century. His use of a Marxist framework as the basis for his analysis is a welcome counterpoint to the customary models employed by most students of organizations. All too often we engage in shallow self-scrutiny which passes as a serious attempt to analyze the faults in our field and suggest new directions to revitalize the study of organizations and the people in them. Our efforts rarely question the uses to which the results of organizational investigations are put, yet some questioning of purpose is a vital part of any truly critical review. While this book may not increase our powers of self-perception, the critique of capitalism inherent in the Marxist framework should force the reader to seriously consider how organizational science is utilized.

The basic arguments on which the book is based are all presented in Chapter 1. Edwards argues that labor under capitalism is a commodity from which the capitalists try to extract as much as possible for as little cost as possible. This effort at exploitation creates a fundamental tension between the worker and the capitalist. Control systems are created in an effort to deal with this tension. While the type of control system is determined, in large part, by the social and historical context in which the business operates, because people are involved there is an inherent indeterminancy to the labor process. Control systems are the mechanisms utilized to organize work so as to reduce the conflict engendered by such indeterminancy. However, no control system can eliminate the tension between management and workers that exists solely on the basis of a capitalist mode of production. This tension will constantly resurface, forcing further alterations in the mechanisms of control. It is a series of such transformations in the workplace in the course of this century that Edwards seeks to document.

According to Edwards, control systems coordinate three aspects of the labor process: (1) the direction; (2) the evaluation; and (3) the discipline. In small firms such as those that typify the early development of the American economy, a single entrepreneur handled all three aspects of control through direct contact with the production process and the workers. This mode of simple control gave way, with the growth of large firms and an increasing state involvement with the economy, to more structural forms of control, i.e., control brought about either through structuring of the labor process (technical control) or the social process (bureaucratic control). The end result of these transformations has been a fractionalization of the working class that has altered the face of national politics. The remainder of the book goes on to detail the phases and repercussions of this transformation.

The fractionalization of the working class combines with the merger of public and private sectors through bureaucratic control to shift the class struggle to the state level, where the struggle is seen in the form of "class fraction politics." In essence, the tension on this level is between the needs of a capitalist economy and the demands of a democratic government. Capitalist control over government is essential to the well-being of a capitalist economy but is rendered uncertain due to fraction politics. The danger, according to Edwards, is that the substance of a democratic government will be gutted, while the form is maintained. In the final chapter he argues that a democratic and socialistic system that allows for participation in decision making on all spheres and levels is the best answer to this dilemma.

Three aspects of this work stand out as significant. First, it redresses the one-sided view that dominates the management literature. Too often students of organizations accept the premises of capitalism or assume that they are aware of the needs of workers. Rarely are these assumptions thoroughly subjected to critical review. Edwards' emphasis on unions and the struggle of workers to achieve equity is a welcome relief from this serene portrayal of management-oriented research. Second, throughout this work, Edwards makes good use of statistics and secondary data to support his arguments. The longitudinal and historical nature of much of the supporting data adds to the power of the points being made (for example, the displacement of foremen with the rise of technical control is validated through a review of employment records on the number of foremen employed over a span of years). Third, this study provides a substantive backdrop against which to examine several of the important topics in organizational behavior. In following the interplay between management and workers over the course of the twentieth century, Edwards presents an excellent illustration of the relation between organizations and their environments. It is obvious that while organizations are determined by the conditions in their environment (Aldrich, 1979), they are equally able to enact their environments (Weick, 1977). Generally, Edwards' analysis does not allow for simplistic answers to the complex questions that confront organizational researchers. However, there are aspects of this work that may prevent the reader from taking full advantage of its potential.

The major drawback to this work is also its major strength: the use of a Marxist paradigm and its critical stance towards capitalism. Part of the drawback arises from the polemical nature of portions of this work (for example, the section on democratic socialism). While the polemics themselves may make certain readers defensive, it is the presence of a few unanswered questions that is most disturbing. First, there is some confusion as to the level of analysis. Despite the identification of several individual capitalists, it seems apparent that Edwards refers to capitalists as a class of people. It is never clear just who composes this class. While the brunt of the argument presented relies on macro-level concepts, the realization of these events occurs on a micro-level. By failing to deal with these processes on a micro-level, Edwards is forced to rely on judgment rather than analysis in parts of this book (again the polemics). The characterizations of workers that open Chapter 1 are examples of this failure. Edwards recognizes his failure to deal with the social existence of workers (or of the capitalists for that matter). It seems apparent that consideration must be given to the perceptions or consciousness of workers and management if a thorough Marxist analysis is to be undertaken. While the economic descriptions of the labor market segments, processes, and outcomes are revealing, without an examination of how the workers' perceptions relate to these segments, much of Edwards' arguments must remain suggestive.

The strength of the analysis lies in its ability to provide a framework in which to critically evaluate the uses to which developments in organizational research are frequently put. Edwards' description of the transformation of control systems reads like an outline to an introductory course in organizational behavior. All of these developments occurred under the guise of objective investigation, yet the results are not without political consequences. While the reader may not agree with Edwards' interpretation, one cannot finish the book without critically considering the uses of organizational behavior. That alone is enough to recommend reading this work.

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Organizational Functioning in a Cross-Cultural Perspective.

George W. England, Anant R. Negandhi, and Bernhard Wilpert, editors. Kent, OH: Comparative Administration Research Institute, Kent State University (distributed by the Kent University Press), 1979. 322 pp. $15.00.

This volume contains 11 papers, each of which is commented upon by a critic, as well as an introductory chapter and conclusions by the editors. Both papers and comments were originally presented at a conference in Hawaii in 1977.

The title is rather misleading, for "organizational functioning" suggests, I think, an emphasis on the *workings* of the organization *as a whole.* However, many contributions deal with attitudes and beliefs instead of processes and have individuals or groups (mostly managers) rather than organizations as the units of analysis.

If the above interpretation of the title is correct, then only three reports fulfill the title's promise. In Chapter 5, Brown and Blandin present an attempt to replicate, in the U.S. and in Denmark, the work of Lawrence and Lorsch. They selected electronics firms in both countries as examples of firms in a highly uncertain environment, while wood products firms in the U.S. and process industry companies in Denmark represented organizations in a relatively secure setting.

The investigators found that the U.S. electronics firms were significantly more differentiated and more integrated and also that they more frequently used forecasting methods than the firms in the wood industry. In the Danish subsample no such differences came to light, which is not surprising since the two sets of Danish firms hardly differed as to the degree of uncertainty of their environment. On the whole, all the Danish firms exhibited not only lower levels of uncertainty, but also less use of forecasting methods, less differentiation, and less integration than their American counterparts. Brown and Blandin ascribe these differences to political, economic, and sociocultural factors. Nevertheless, one cannot help but wonder to what extent the difference is not due simply to the fact that the researchers happened to pick Danish organizations in environments not sufficiently varied as to uncertainty.

De Kervasdoue and Kimberly (Chapter 10) compare data from an American and a French study on hospital innovation and reveal the agonies of their scholarly souls in search of a new paradigm. Initially, the research team also took its lead from Lawrence and Lorsch and set out to explain innovation in terms of organizational characteristics such as size, differentiation, and integration. The hypotheses in question were confirmed for the American but not — at any rate, not to the same extent — for the French hospitals. This finding, further analysis, and reflections undermined the authors' faith in the "comparative structuralist paradigm" and stimulated their attempts to construct an alternative that could do justice to the socio-political context of organizations. The authors give some impressions of what such a new paradigm ought to look like and provide the reader with a very intriguing outline of the intricacies of the French, but oddly enough not of the American, health care system.

I found this, alas, too rare mix of the usual, virtuous, and scholarly report with an animated "inside story" quite lively and instructive. Whether the authors are right for the right reasons in their criticisms of the "comparative structuralist paradigm" is another matter. Money, in his comments on this paper, makes a challenging case for the possibility that culture perhaps does not so much moderate the relationships spelled out in a general theory but rather modifies the meanings attached to certain mechanisms or processes that customarily serve as indicators of the theory's key variables. I would add that, even if such a theory as the one tested by the Franco-American team were contingent upon certain macro-societal conditions (or on any other conditions, for that matter), this does not necessarily imply that the paradigmatic base of such a theory is "wrong." It can also mean that one has to extend the theory so as to encompass these contingencies. Maybe the authors' disaffection with the old paradigm has more to do with a change of interest in the *kind* of organizational phenomena and aspects covered by this approach than with the specific results of their project.

The last contribution concerned with organizational functioning from a cross-cultural perspective is Blankenburg's essay (Chapter 14) on employment administration in five European countries. The title "Comparing the Incomparable" indicates the author's problems with "the paradigmatic tradition of studies in comparative organizations" (presumably this "tradition" is the same one as the paradigm criticized by de Kervasdoue and Kimberly). Blankenburg finds the conventional wisdom of organization theory wanting since his units of analysis are not organizational entities, but sets of tasks such as administering unemployment insurance, and regulatory, mediating, and policy tasks. Students of public administration will recognize this issue as the familiar controversy as to whether the main objective of the comparative branch of their discipline is to compare structures or compare functions.

Of course, when opting for the latter strategy of comparative analysis, one must be prepared to face the possibility that in various countries different organizational units perform similar functions, as is the case with unemployment administration tasks. The author advocates studying the formation and execution of labor market policies against the background of organizational networks and national administrative cultures. The reader gets a good taste of this holistic approach in three sketches of the structure and functioning of labor administration in Italy, West Germany, and the United Kingdom.

Blankenburg, however, is not satisfied by merely juxtaposing the three national "pictures." He apparently feels that, after all, "the incomparable" is, or ought to be made, comparable and undertakes a comparative analysis with the aid of traditional concepts like centralization/ decentralization and patterns of organizational control. He stresses, like Money, that the operationalization of such concepts may vary from culture to culture, and he finally breaks a lance for the application of *Verstehen* to make sense out of the different "logics of action" in various theaters of operation.

In a way this paper, like the one by de Kervasdoue and Kimberly, which combines an "outside-" with an "inside-story," is quite original and thought-provoking, but at the same time it is a bit inconsistent, as Takamiya's pointed comments convincingly show. By groping after a new perspective without forsaking the firm ground of conventional organizational theory, Blankenburg exhibits an ambivalence that will leave many readers with profound doubts about both the old and the new perspective! In principle, the difficulties the author experienced could be overcome by extending the traditional paradigm rather than by replacing it.

Endruweit's study of German and American police (Chapter 12) is much more a description of the structure than an analysis of the functioning of the organizations in question. In explaining differences in size, police density, hierarchical design, recruit selection and training, the author pays a good deal of attention to the larger societal context. Casually here and there, the author offers quite perceptive insights and considerations, such as those on the way in which historical factors relate to present-day circumstances.

The next batch of papers — constituting more than half of the book's research reports — has little or nothing to do with organizational functioning but concerns attitudes or beliefs of organizational participants in different countries. Admittedly, in some cases (i.e., Chapter 3) the methods used make it more likely than in other cases that the perceptions of the interviewees are connected with processes that could affect the ways in which their organizations function, but in all these chapters this remains very much a matter of hope and faith on the part of the authors rather than a focus for their research. Although space does not permit detailed reviews of all these papers, I will mention those that I found most thought-provoking.

In Chapter 3 Heller and Wilpert present findings on investigations in six European countries, the U.S., and Israel, carried out through the so-called Group Feedback Analysis of managerial decision making. Averages are given per sector and per country. Intersector differences tally with earlier research outcomes, while the international variations show quite conspicuous deviations from those found in previous studies. Furthermore, the researchers found interesting correlations between degree of centralization in decision making (as reported by either the managers in question or by their subordinates) and perceived distances in job requirements between, and in levels of skill at, adjacent hierarchical levels. Heller and Wilpert, as well as their commentator (Davis), assume that managers adjust their decision behavior to their perceptions of skills and skill requirements. That sounds quite plausible, but is it not equally plausible that inter-level differences in skills and skill requirements are over- or underestimated in accordance with the managers' inclinations to be the boss, the sole boss, and nothing but the boss?

In Chapter 4, Hoover, Troub, Whitehead, and Flores describe the Yugoslav system of self-management and the Peruvian system of co-determination, introduced in 1970. They also present survey data gathered in these two countries in 1976 in which they asked managers to rank a number of goals as to their current importance and their importance five years earlier. Contrary to their expectations, the authors found no evidence of any shifts in the priorities of Peruvian managers. They discuss and interpret this and other findings in a thoughtful and informative manner, aware of the limitations of the design of their study.

After a lengthy exposition of their conventional approach to culture and its influence on organizations, Beres and Portland (Chapter 3) analyze data on work values of employed Americans and of a subsample of Americans of European descent. On the whole the results are consistent with their theory, but the indicators used are quite remote from the variables referred to in the theory. It would be worthwhile, I feel, if the investigators, in their subsequent research, would seek ways and means of studying the interconnections between their nominal and operational definitions.

England and Negandhi (Chapter 9) also present data on work values; in addition they present data on employee concern about various societal issues and problems, on the nature of management styles, and on preferences and willingness to participate in decision making. The authors compare survey data from American auto and steelworkers and Indian steelworkers. Workers' attitudes about public issues did differ in the two countries but in several other respects (i.e., factors seen as influencing satisfaction and promotions, perceptions of participative possibilities) inter-country variance was not impressive. The authors see the results as corroboration of their critical stance toward the presumed ubiquity of cultural influences on organizational behavior.

Chapter 13, by Frost and Hayes, does not apply a cross-cultural perspective, nor does it pertain to organizational functioning. It is a model of political behavior in organizations, for which meager empirical evidence comes from an Australian and a Canadian college. Although there was no reference made to the effects of political games on organizational processes or to the role of hemispherical differences, I must confess, nonetheless, that I found this contribution one of the most sophisticated and fruitful pieces of the whole book.

The book is really a volume of conference proceedings rather than a reader with a well-defined editorial policy intended to assess the state of the field and promote certain new or emerging ideas. The batch of papers and comments is quite uneven and heterogeneous, and the editors' introductory and concluding remarks, although often well taken, sometimes stimulating, and always sensible, are not substantive enough to lend coherence to the collection.

It also appears that neither the editors nor the publisher bothered about the editing from a professional-technical point of view. This is not merely unsatisfactory from an aesthetic point of view; it also reduces the utility of the book for the reader. To mention just a few iniquities: in their introduction the editors (pp. 11–12) briefly discuss a paper that is not in the book! It escaped their notice that in some places (pp. 56–57, 197) confusing discrepancies occur between the data in the tables and what the authors say about them in the text. Some comments (e.g., on pp. 127–128) are so non-committal that the editors would have done their book (and the commentator) a favor by deleting or replacing them. References appear to an author without a book (p. 136), to a journal without a year indication (p. 123), to books that are not yet published or were published in other years, by other publishers, or under different titles (p. 209).

In some instances (pp. 221, 297) references are given to papers "presented at the Conference on Cross-Cultural Studies on Organization Functioning, Honolulu, Hawaii" with the risk that some innocent reader is sent on a wild-goose chase to obtain a paper from someone at the other side of the world while this very paper is to be found as a chapter of the book on his desk! The subject-index is so short that it is of little benefit to the reader. Needless to say, the book abounds with printing errors.

Although my conclusion is that the whole is not much more than the sum of its parts, the sum is not insignificant. As indicated, many of these papers are quite valuable and informative. Having this set of papers on one's bookshelf provides one with a realistic and fairly representative sample of important styles of work, findings, and insights which jointly make up the field of cross-cultural organization and comparative management studies today.

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Economic Democracy: Workers' Participation in Chilean Industry, 1970–1973.

Juan G. Espinosa and Andrew S. Zimbalist, editors. New York: Academic Press, 1978. 211 pp. $16.50.

This book is the product of a quantitative, empirical study of a fascinating experience: the large scale social experiment with industrial democracy in Chile between the years 1970 and 1973. The study was so well designed that it addressed itself to many of the basic issues concerning that controversial aspect of those tumultuous years in Chile's history. The authors and their assistants at the University of Chile clearly worked immensely hard collecting data on the 35 firms they investigated. The problem with the study lies in the source of data, hence what exactly was measured, hence what exactly is demonstrated by the very interesting results.

The "People's Unity" (UP) coalition (basically the Socialist and Communist parties), which won the Chilean presidential election of September 1970 under the candidacy of Salvador Allende, found itself responsible for administering an ever-larger proportion of Chile's industrial sector. In February 1973, that sector contained 80 percent of manufacturing output and a total of 2[illegible] enterprises. I used the phrase "found itself responsible" because in many instances, the transfer occurred not as a result of a planned initiative on the part of the government but as a result of a somewhat spontaneous takeover by workers or others, who then handed the plants over to the government. There were many variations on that theme: reaction to some of the questionable practices played a role in middle class support for the 1973 coup that overthrew Allende.

In anticipation of the existence of a public sector (APS — Area of Social Property), the Government signed an agreement with the Central Trade Union Federation (CUT) as early as December 1970 specifying the manner in which workers, their representatives, and trade unions would participate in the making and administering of policy from the national level through sectoral and industry levels, down to the plant, and below. During 1972 and 1973, most observers — from the Left through the Center to the Right (of course!) — thought that participation was not working well. One of the authors of *Economic Democracy* wrote shortly before the coup that in 10 percent of the state firms there was "genuine worker involvement and consciousness in decision making" (Zimbalist and Stallings, 1973: 12).

The tone of this later study, however, is much more upbeat, although it is fundamentally a correlational study — what makes for greater or lesser success and failure? — and not an attempt to assess the average level of success. The conceptual design is basically clear and visible, but it is a design with many more variables than an *N* of 35 can support statistically. There is a set of antecedent variables including the technical-bureaucratic structure of the industry and characteristics of the labor force, political and organizational as well as educational. Each of these is measured by several indicators. The intermediate variable is participation itself, once again measured by many indicators to take into account the conceptual complexity of participation (the degree of power and the range of issues over which it is exercised, frequency, setting, etc.). Finally there are the "output variables," including a set of economic measures (productivity, innovations, investment, spoilage), morale indices (absenteeism), and others.

This is indeed an ambitious enterprise, and there is a big catch in it. To gather reliable data on dozens of indicators for 35 firms for three time periods (to permit the kind of before-and-after comparison in which the authors were interested) would not only have been a herculean task, it would have been impossible in many cases. Hence, as footnotes and appendices make clear (and they need to be carefully read), data on many objective-sounding concepts were in fact obtained by asking key respondents for assessments.

This becomes crucial in evaluating some of the study's most interesting results. We find that firms in which unions were in the hands of Communist Party members (regarded as arch-conservative obstacles by the authors and by others with a "revolution now" orientation) are also those in which the industry was not taken over by the workers themselves; in which participation was not working well; and in which spoilage remained high. Are we face to face with correlations among a set of objective facts or, since much of the data was obtained from one or a group of like-minded informants, are we dealing with correlations among beliefs, perceptions, and attitudes? That, too, would be interesting and worthwhile but possibly less so and certainly different from a correlation among objective facts.

The authors have not faced that problem, and it is to my mind such a serious one that I would not accept their results as they interpreted them. The study is therefore best viewed not for the results obtained, but as a very ambitious attempt at a rigorous, conceptually well-thought-out study, extraordinarily well integrated into various and very diverse bodies of relevant literature. It is a giant first step, waiting to be improved upon, although the next step — working with more objective indicators — will not be easy.

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Human Inference: Strategies and Shortcomings of Social Judgment

Richard Nisbett and Lee Ross. Englewood Cliffs, NJ: Prentice-Hall, 1980. 334 pp. $14.95.

"Being of sound mind and judgement" is a phrase few of us feel called upon to use in self-description, unless preparing our wills. It is so clear (at least to ourselves) that our judgment is, in fact, generally sound that we feel little need for explicit claim. However, as the evidence reviewed in this important book makes clear, a little more modesty in our assessment of our judgmental skills would be entirely appropriate: we have plenty to be modest about. Clarifying the grounds for such modesty — knowing when and in what ways we are prone to judgmental errors — is of value to us individually, both in our everyday groping with the world as "intuitive scientists," and in our professional roles as "formal scientists." Still more does such an understanding raise novel and important questions for organizational science.

Nisbett and Ross use this contrast between the "formal" and the "intuitive" scientist as the central organizing device of the book. For both, the broad aim is to achieve some understanding of the world and to predict and control its events. When an individual fails to utilize available data appropriately — that is, commits inferential errors — these purposes are frustrated. We know the world only indirectly, continually making inferences from limited information. As "formal" scientists, we strive to follow inferential procedures that provide some safeguards against such errors. How do we fare when these safeguards are lifted — as, clearly, they generally must be, as we go about the business of our daily lives? A rather cautious answer seems demanded by the evidence reviewed by Nisbett and Ross.

In barest outline, the central argument of the book is fairly straightforward. We are continually faced, in our everyday lives, with daunting inferential challenges, to only a tiny fraction of which do we bring the apparatus of formal scientific inference to bear. For the rest, we must rely on a variety of informal inferential strategies, most of which we employ swiftly without being consciously aware of either their nature or limitations. Over the past decade or so, research understanding of several such intuitive strategies has grown rapidly. It is now possible to review and synthesize the findings from this exciting set of developments, to suggest what strategies are commonly used, the strengths and weaknesses of each, and, in particular, the circumstances under which they are likely to bring us to significant inferential error and costly misguided action.

Two general kinds of intuitive inferential strategies have been extensively explored:

1. *Knowledge structures*: As adults, our abilities to label, categorize, form expectations of, and respond to, complex stimuli are strongly shaped by our preexisting knowledge structures — beliefs, theories, scripts, schemas, and the like. Such shaping is, clearly, essential to dealing with any complex environment and may be normatively appropriate, to the extent that the theory is relevant and sound. However, when knowledge structures map reality poorly, they may lead to serious (and subjectively undetectable) inferential error.

2. *Judgmental heuristics*: Cognitive economy is also served by the use of intuitive inferential strategies, including those labelled by Tversky and Kahneman (1974) as the "availability" and the "representativeness" heuristics. The former leads us to judge events or objects as frequent, probable, or causally powerful by the ease with which we can bring examples to mind. The normative appropriateness of this heuristic is highly variable, since the "availability" of recallable instances is influenced by many factors other than objective frequency: recency, vividness, differentially efficient search procedures, and others. The "representativeness" heuristic refers to our tendency to categorize events or objects on the basis of their resemblance to the underlying category characteristics. Again, the strategy is, at root, a sound one, but is vulnerable to over- and mis-use. Our intuitions of the extent to which, say, small samples are "representative" of underlying populations is quite poor. The gambler's fallacy, for example, appears to turn on our misguided intuition that a run of reds will be followed by a run of blacks, to restore the "representativeness" of the sample to the underlying fairness of the wheel.

The book is heavily concerned with the operation of these intuitive inferential strategies and with the astonishing range of both everyday and work-related contexts in which their effects are manifested — with deleterious consequences ranging from mild embarrassment to potential catastrophe. The first part of the book (Chapters 1 through 3) provides an overview of the issues to be examined and a survey of the intuitive strategies themselves. The second part of the book (Chapters 4 through 8) probes more deeply the contrast between the formal and the intuitive scientist as each goes about the crucial inferential tasks: characterizing data, samples, and populations; assessing covariation; making assignments of causality; predicting future events; and formulating and revising theories. The final section of the book (Chapters 9 through 12) examines the implications of the findings in four areas: the limitations of our self-insight; the relative importance of cognitive and emotional factors in lapses from rationality (the "hot versus cold cognitions" issue, in Abelson's [1963] characterization); an assessment of the extent of the practical damage attributable to our inferential failures; and, finally, some thoughts on the possibilities for improving human inference.

Even to outline the research challenges and opportunities this book opens up for the organizational sciences would require an essay far beyond the scope of this review. The broad thrust of such an effort can, however, be sketched fairly briefly. A significant, perhaps a growing, number of organizational scientists find (as does this reviewer) a research focus on the interaction between the information processing and decision-making processes of organizations and their members a fruitful approach to a broad range of organizational phenomena. Indeed, broadly interpreted, such a view could be said to embrace a large fraction of the discipline, from expectancy theoretic treatments of individual motivation to the Vroom-Yetton decision-tree approach to leadership, from the Galbraithian view of organizational design to the survey feedback approach to organizational development. In each case, research interest is drawn to two key questions: In what informational environment are the actors operating? and What are they doing with the information they have available?

In light of the evidence marshalled by Nisbett and Ross, both these questions need extensive reconsideration in the organizational context. One has only to recall the huge and fruitful impact on the development of the field of Simon's general postulation of "bounded rationality" to realize how central are cognitive assumptions to the understanding of organizational functioning. Nisbett and Ross have moved us a long step forward in understanding in just what ways our rationality is bounded, and the behavioral implications of this boundedness. There seems every likelihood that, as the work on inferential limitations filters into the thinking of the next generation of organizational scientists, important new light will be shed on many of our most troublesome issues.

In my own field of organizational decision making, one can begin to sketch the issues that a new synthesis must deal with. Janis and Mann (1977) make a strong case for the importance of "hot" cognition — thinking heavily influenced by affect, unconscious motives, self-serving biases, and so on — in organizational choice. Nisbett and Ross argue persuasively that a focus on "cold" (or, at least, "cool") cognitive processes and their distortions offers a more parsimonious explanation of lapses from rationality. Since each pair of authors draws heavily on the work of the other, there seems good hope for a real confrontation between the two lines of thought, rather than the independent development more common in the field. The challenge for the organizational decision theorist is, clearly, to embed the "hot versus cold" debate firmly in an organizational context: in the world of loosely-structured, multi-person, "garbage-can" processes detailed by March and Olsen (1976) and the hectic, interrupted, harried world of Mintzberg's (1973) managers. Only by such contextual embedding, I would argue, can we hope to respond to a challenge such as that posed by Weick (1979) to take seriously the idea that real thinking does (or could) take place in organizations. And only by such an embedding can we start to see managerial action not merely as the end-product of managerial thought but as a potentially crucial part of the decision process itself (Connolly, 1980).

This is not to suggest that *Human Inference* will be of interest only to organizational decision theorists. It is hard to think of any serious student of organizational processes who will not find the work of major interest and value. The clarity and freshness of its writing make its ideas accessible to any serious graduate student; the breadth of its coverage makes it essential for the professional's library. It is, in short, a work of the highest importance, a triumph both of scholarship and of presentation. On the short list of 1980 books to acquire, this must certainly be one.

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Unions in Postindustrial Society.

John Schmidman. University Park, PA: Pennsylvania State University Press, 1979. 152 pp. $12.00.

This book sets out to provide a theory of the labor movement in postindustrial society. The United States economy is said to have entered its postindustrial era in the post World War II period when the growth of the service or tertiary sector of the economy outpaced that of the manufacturing sector. I did not find in this book much in the way of a new theory of the labor movement. Any theory that is provided is essentially a restatement of what has come to be known as the Wisconsin tradition. The contributions provided by the book are a review of existing theories of the labor movement and a discussion of the likelihood that union organization will expand in the service sector of the U.S. economy.

Schmidman predicts that unions will be able to organize workers in the tertiary sector of the U.S. economy. Unfortunately, exactly how the union movement will overcome its past inability to organize white collar service workers in the private sector is left unstated. Schmidman apparently accepts largely as a matter of faith the proposition that union organization is inevitable because of the persistence of the authority relation in postindustrial society.

In places I found the book inconsistent. In Chapter 1, the author suggests that unions will evolve into a two-tiered form with upper level union officials dealing with broad political concerns while lower level officials deal with traditional job-related collective bargaining issues. A brief but interesting discussion follows that assertion in which the author considers some of the problems that might be created by such a bifurcation. Yet, in Chapter 6 the author offers a new prediction that in the future the American labor movement will easily accommodate itself to political action that reinforces its collective bargaining concerns. Somewhere along the way the problem of bifurcation has disappeared.

The best parts of the book are Chapters 2 and 3, which provide an extensive, although uncritical, review of existing theories of the labor movement. Readers might find those chapters useful as supplemental material in a course that addresses those theories.

The book's factual discussion of the economic environment in 1980 is sorely deficient. The author describes the state of the U.S. economy and labor market in 1980 by relying on predictions of the Bureau of Labor Statistics. I am puzzled as to why a book written in 1979 would rely on those predictions rather than refer to the facts. This is particularly troublesome in the light of some of those predictions. The author accepts the BLS prediction that in 1980 nonfarm productivity will continue to advance at a steady rate. Well, it is now 1981 and the slowdown in the productivity growth rate is one of the nation's major public policy problems. Furthermore, that slowdown apparently began in the early 1970s and certainly should have been discussed in a book published in 1979.

That flaw is symptomatic of a much more significant error that plagues most postindustrial theories. Those theories adopt an unbridled optimism which assumes that industrial problems such as the economy's generation of either a sufficient number of good jobs or adequate productivity growth have all been solved. I think the nation's current economic problems call into question both that sort of unbounded optimism and the basic premises of postindustrial theories.

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On the Psychology of Military Incompetence.

Norman F. Dixon. New York: Basic Books, 1976. 448 pp. $12.50.

The basic assertion of this book is that the incompetence demonstrated in battles ranging from those in the Crimea to those in Viet Nam by a minority of senior generals can be traced to a set of common personality characteristics. As a former British army officer, Dixon draws most of his examples from British military history. However, he assures the reader that neither incompetence nor the personality characteristics which may be its antecedents are exclusively British in nature.

Although Dixon limits his discourse to military situations, generalization to other large bureaucratic organizations is quite straightforward. For this, among other reasons, *On the Psychology of Military Incompetence* should be of interest to readers of *ASQ*.

Following an introductory chapter, Dixon describes the difficulties associated with being a senior battlefield commander. This is probably the weakest chapter of the entire book. He gets caught up in an analysis of the general as an information processor with comments about channel capacity, noise, and perceptual distortion. While nothing he says is patently wrong, most of what he says in this chapter is not relevant to his thesis, nor does he return to the topic later.

The next ten chapters are devoted to cryptic sketches of military blunders. These historical sketches take the reader from the Crimean War, with the charge of the Light Brigade, to the Second World War, with the Japanese capture of Singapore and the ill-fated attack on Arnhem, which was dramatized in the film, "A Bridge Too Far."

In an author's note preceding this section Dixon states (p. 26),

> Since the object of the exercise is not the writing of another military history but rather something more analogous to the detecting of weak signals in a noisy background, these precis are deliberately selective and deliberately superficial in their treatment of surrounding context; for it is only by amplifying the signals and playing down the noise that the pattern (if there is one) comes to light.

Notwithstanding the above note, several questions arise. Is Dixon's history good history? Are his examples representative of military blunders, or did he select only those that support his thesis? How common are these blunders? Do the patterns of behavior exhibited by Dixon's generals reappear in actions or campaigns other that the ones he describes? Dixon leaves these questions unanswered. Regardless of the answers, he does make the point that throughout modern history, military incompetence has caused the needless loss of literally thousands of lives and the unnecessary and extreme suffering of thousands and thousands more soldiers and civilians.

The next 12 chapters, which make up Part Two of the book, are devoted to presenting Dixon's analyses of the causes of military incompetence. By describing the background, schooling, and experience of the various generals responsible for the disasters listed in Part One, he lays to rest the popular notion that the primary cause of incompetence is stupidity. None of these generals were demonstrably stupid, although all committed what might generously be described as stupid acts.

Rather than stupidity, it is authoritarianism that Dixon singles out as the root cause of military incompetence. He views the authoritarian personality in the form originally described by Adorno et al. (1950). The authoritarian general is described as one who is conforming, submissive to authority, punitive, sexually inhibited, over-controlled, ethnocentric, anti-intellectual, assailed by doubts as to his virility, anal-obsessive, superstitious, status-hungry, rigid, possessed of a closed mind, and saturated in discipline. Given this basic personality core, several other characteristics such as fear-of-failure and groupthink are derived as logical extensions. Dixon also posits that the authoritarian military commander should be particularly sensitive to the pressures exerted by states of cognitive dissonance. It seems quite obvious that a general possessing all, or even a majority, of the above personality characteristics would have great difficulty on the battlefield. Unfortunately, as Dixon points out, these same characteristics, so ill-suited for combat command, are often rewarded in the peacetime military. Since most armies spend much more time in peace than in war, the author argues that a military career may be particularly attractive to individuals with strong authoritarian tendencies. As the author describes them, peacetime or garrison military organizations, with their emphasis on formality, drill, discipline, spit and polish, and bull, are strongly authoritarian in nature. This then, according to Dixon, would account for the presumed fact that authoritarian personalities are over-represented in military organizations.

Several chapters of Part Two are devoted to exploring possible developmental antecedents of authoritarianism from British upper and middle class child rearing practices to the educational methods of British public schools. Both the view of the authoritarian personality as a unitary syndrome and the psychodynamics involved in its development appear to be drawn directly from the original work of Adorno et al. (1950). If these analyses of the British middle and upper classes, from which most of the nineteenth century British officers were drawn, as well as the author's descriptions of military organizations are accepted at face value, one cannot help but wonder why, as Dixon often reminds us, only a minority of military commanders are or were so afflicted.

In the final section the author attempts to answer this question. As he states (p. 307),

> Part Three . . . examines the thesis that good generals differ from bad not in their age, colour or intelligence, but in the degree to which they are able to resist the psychopathology of the organizations in which they serve. Conversely, less than adequate commanders will be those whose minds most closely fit that of their parent organization.

He looks at extremes of authoritarianism as exemplified by German S.S. concentration campgrounds and Heinrich Himmler and contrasts the actions and apparent personalities of such great military leaders as Wellington; Shaka, the Zulu king; Napoleon; Nelson; and T. E. Lawrence with these Nazi examples as well as with his previously described incompetent generals.

Dixon then considers and rejects the hypothesis that authoritarianism and incompetence may not be positively correlated, at least as represented by three controversial figures, Montgomery, Kitchener, and Haig. Dixon asserts that for these commanders success came from an ability to overcome authoritarian tendencies while failures resulted directly from their expression. Certainly at this point, as at other places in the book, the author's reasoning appears somewhat circular. While his statements are always that incompetence and authoritarianism are merely positively correlated phenomena, the impression that he generates is that they are one and the same.

On the Psychology of Military Incompetence generates an ambivalent set of impressions. In large part it rings true. Military organizations do appear to attract and foster authoritarian personalities. The behavioral characteristics generally associated with authoritarian individuals do often result in peace time promotions and at least sometimes yield combat disasters. However, Dixon makes too strong a case for the notion that authoritarianism of individuals coupled with that of military organizations can account for all military incompetence. Further, only one schooled in psychoanalysis could appreciate the considerable space devoted to the developmental dynamics of authoritarianism.

Dixon's history is probably adequate for his purpose. However, it can be challenged, especially when he speculates about the motives and reasoning of his incompetent exemplars. Psychohistory is never very satisfactory, since almost any historical occurrence is subject to a wide range of interpretation. While Dixon tends to overstate his case quite frequently and admits to no exceptions to his contentions, he does provide rather convincing arguments. Stylistically, the book is well written and holds the reader's interest. The major value of the book may be as a stimulus to thought and as a source of hypotheses. It raises many more questions than it answers. Several senior American army officers who have read the book indicated to this reviewer that it caused them to engage in some extensive and fruitful, introspection.

It is interesting to note that *On the Psychology of Military Incompetence* has been placed on the army's "Contemporary Military Reading List," an official list of recommended books sent to all U.S. Army officers.

Readers may wonder about the extent of authoritarianism in the modern American military. This reviewer has been privileged to observe, over the last ten years, several thousand senior military officers as they passed through the U.S. Army War College. Few, if any, of these officers demonstrated the extremes of authoritarianism that Dixon attributes to the incompetent generals he describes. However, Dixon asserts that authoritarianism is a continuum ranging from very low to very high. On such a scale, the average senior army officer could probably be placed somewhat above the average for the general population.

An unpublished study conducted in 1972 and 1973 by Bowers (undated) of the Institute for Social Research also bears on this question. In a sample of naval officers and age-matched civilians, he found that belief in autocratic supervisory practices was significantly lower among naval officers than among their civilian counterparts. This was especially true for the most senior officers who were the least likely group to express belief in autocratic supervisory practices.

A recent study by Schreiber (1980) of authoritarian attitudes of U.S. Army enlisted personnel found that authoritarian attitudes decreased with time-in-service for first term soldiers, but increased with time-in-service for soldiers who had reenlisted. From these cross-sectional data it was concluded that this curvilinear relationship was not the result of individual changes over time but rather the result of " . . . a propensity of soldiers with more authoritarian attitudes to reenlist . . . " (p. 129). This finding is consistent with Dixon's assertion that military organizations are selectively attractive to individuals with authoritarian tendencies.

Dixon is particularly well qualified to write a book such as this one. For ten years he was a regular officer in the Royal Engineers and attained the rank of major. After leaving the service he received two doctorate degrees and is now Reader in Psychology at University College, London. As he states (p. 405) in an afterword,

> Lest the reader should have doubted my qualifications to write this book, let me reassure him that I have marked authoritarian traits, a weak ego, fear of failure motivation, and no illusions about the fact that I would have made a grossly incompetent general. It takes one to know one!

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Organizational Behavior.

Steven Kerr, editor. Columbus, OH: Grid Publishing, 1979. 460 pp. $18.95.

Organizational Behavior is a book that departs from the traditional form. It is not a standard textbook composed of a series of chapters, most of which are written by an author or coauthors. Neither is it a collection of readings such as those constructed by an editor who brings together a selection of articles, book chapters, and, occasionally, a piece written specifically for the book. *Organizational Behavior* is a multi-authored book. Kerr describes it as a book "written by twenty different people, . . . a renowned group of scholars and researchers" (p. ix).

For Kerr, such an approach would have two advantages. The first would be expertise. Each author could write a chapter in his area of special interest and competence, with sufficient self confidence to ignore "classics in the topic area which were deserving of being ignored" (p. ix). The second advantage would be the currency in each field of the material presented, which would be more up-to-date than in a traditional text because the chapters would be written simultaneously, rather than over a long period of time.

With these ideas in mind, Kerr's "renowned group of scholars" produced the sixteen chapters of which the book is comprised. The bill of fare is quite standard for a text of this sort. It suits my personal preferences rather nicely, particularly because there is a strong, and generally good, treatment of the organizational issues that have come to be called "macro issues."

There are five parts. Part I ("Foundations") includes chapters on history, research methods, motivation, and decision making. Lateral relationships are the focus of Part II, which contains chapters on work groups, communication, and conflict. Power, leadership and performance appraisal make up Part III. Part IV, "The Organization," examines technology and structure, the effects of control systems, and organization climate. Job design, organizational development, and organizational growth are treated in Part V. About the relationships between these parts, Kerr says (p. x):

> This [book] is not, it must be confessed, possessed of a truly integrative framework. This choice was made because different instructors use textbooks in different ways, often in a sequence different from the author's. The book was therefore designed so that each chapter can stand alone, and chapters may be mixed or matched with little damage to comprehension. Nevertheless, we hope you find the book is integrated, that the right hand knows what the left hand is up to, that terms are defined before they are used, and that the use of a term in one chapter is consistent with its use in others.

The logic underlying this book is compelling and seductive. Such a book should have almost everything that a competent instructor would want in a textbook, e.g., good content, currency, and reputable authors. The appeal for the publisher is that the book could be quickly produced, it would have market appeal because of the luminaries writing the chapters, and should have a strong potential for adoption as a text at the twenty schools where the authors toil. For the editor, such a book would provide, I suspect, several challenges. One is the opportunity to make a significant contribution to the discipline. Acquiring the cooperation and time of the various authors is surely another challenge.

To some degree, Kerr has been successful. The authors of the various chapters have achieved a degree of professional repute in the subject area about which they write. While I might not be so bold as to call each one in the group a "renowned scholar," as a whole they are certainly a healthy cut above the mean level and are quite capable indeed. And, as promised, the book contains very current references. There are nearly 700 different citations, of which about 125 are pre-1960. Of the remaining, over 60 percent are sources published since 1972.

Where the book falters is in the execution, not in the logic or the design from which it flows. Perhaps the editor, Kerr, suffers from the same problem faced by a manager of an all-star assemblage of athletes. When brought together for one game, the several outstanding players find it difficult to work together as a team. Each player has an outstanding strength, one is a hitter, another a strong fielder, a third a great pitcher, and so on. In an all-star setting, each is quite likely to emphasize his particular strength, and it is usually very difficult for the manager or coach to obtain the coordination necessary for team play. Similar problems must, I am sure, have confronted Kerr in trying to achieve the kind of integration from writers of the chapters necessary to deliver the book promised in the preface. As Kerr had planned, most writers played to their strengths or their current interests, and this is what likely led to an unevenness (which Kerr wanted to avoid) that is more pronounced than in some single authored texts, some redundancies (that are not critical, though they are annoying), and some inconsistent use of terms (which leads to confusion).

The manner of treatment varies sharply from chapter to chapter. Some chapters are rather well developed and present the material in a full and interesting way. Other chapters are sketchy and general. For example, the decision-making chapter contains a rather lengthy sequence of two-dimensional "models" of decision making, and it is not quite clear why they are presented, how they are related to each other, or why it is important to discuss them. The climate chapter also leads nowhere. It introduces a concept of climate, the correct definition of which "depends upon your own purposes" — hardly a way to introduce a potentially meaningful concept to a student.

In these chapters, some relatively different ideas, generally not part of the conventional literature, are brought into the discussion. The climate chapter introduces "phenomenology," the decision-making chapter discusses concepts of brain functioning. It may well be that ideas of this sort can add markedly to our understanding of human behavior in organizations, but they are obviously complicated notions and are given such short shrift that the reader must figure out, alone, how they might be useful. I confess that it is not apparent to me.

Contrast these two chapters with another pair, and the unevenness among the chapters is readily apparent. The chapter on groups moves nicely and is developmental in character. The power chapter is of the same genre.

There is another form of unevenness that disturbs me. In some chapters, the coverage is standard. The chapter on leadership, a nice review, is an example. It moves from a discussion of trait theory through to contingency theories. There are no surprises and all the "classics" are there. Other chapters, however, rely too heavily on the work of the author and can leave the naive reader with the mistaken view that the major work in the field was done by that person; such is the case with the communications chapter. I doubt this to be true for any of the topics that Kerr selected for inclusion.

Redundancies occur, perhaps because Kerr wanted each paper to stand alone. Several chapters have more than a fleeting discussion of the relationship of the topic to Frederick Taylor and classical management. Organizational growth is the topic of one chapter, while there is an extensive discussion of growth in the structure and technology chapter. A lengthy quote by Etzioni appears, redundantly, in two different parts of the book.

Such redundancies are annoying, but not critical. It is a more critical problem when a topic is discussed several times using different terminology. For example, group intervention approaches are discussed both in the chapter on groups and in the conflict chapter. Each of these chapters uses a different taxonomy of intervention types. Different goal typologies appear in the organization structure chapter and in the control systems chapter.

Kerr's authors failed him in another way. He had hoped they would ignore "classics in the topic area which were deserving of being ignored." I can't think of a "classic" that is ignored. Depending on one's philosophical, empirical, conceptual, or personal tastes, it is possible to argue that some of the following "classic" writers and/or theories did not deserve treatment: Herzberg, Blake and Mouton, Fiedler, expectancy theory, and needs theory. Of course, this material is included in *Organizational Behavior,* as it probably should be.

Whether or not this book will work in the classroom depends on the manner in which a text is used as a pedagogical device and the level of the course in which it is to be used. If the instructor uses a text primarily to introduce basic concepts and then provides a strong integrating framework through lectures, the Kerr book might work nicely. The chapters really do stand alone and are adequately sound from a theoretical and technical point of view for the classroom. However, if a text is chosen to create a gestalt in which an instructor will embed ideas, the book will pose some difficulty, mainly because of the lack of an integrated framework.

The level of student who will use this book should also be considered. I doubt that it will work well in an introductory undergraduate course, since there are far too few clear examples of the rather complex concepts. The book seems best suited for the master's level. Students in a graduate program should have the experience and the academic grounding to handle the materials in *Organizational Behavior.* I suspect, too, that doctoral students might find the conceptual reviews to be quite useful, though some selections are far from complete.

It is difficult to set this book in a well defined niche. It has some nice features, but, though it is generally well written and conceptually sound, it is somehow quite incomplete. Perhaps the reason is that the several selections, while adequate in their own right, do not form the clearly comprehensive mosaic that I believe should be present in a textbook.

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Public Choice.

Dennis C. Mueller. New York: Cambridge University Press, 1979. 279 pp. $24.95, cloth; $6.95 paper.

The field of public choice economics is relatively new, its development occurring largely since 1950 when economists began exploring systematically questions about decision making in nonmarket settings. Traditionally, such subjects as voting rules and voter behavior, the politics of political parties, and the workings of the bureaucracy have come under the purview of political science. Those normally concerned with these questions have a view of the institutional environment as much richer and the citizens, politicians, and bureaucrats who people it as much more complex than is suggested by the abstract and simplified models of human behavior that fill this book. Public choice theorists have, for the most part, taken the state as a union of rational economic men engaged in *quid pro quo* exchange, and asked how such persons conduct themselves when they find they must pursue their individual ends by collective means. This book, the second of the *Cambridge Surveys of Economics Literature,* is designed to provide an overview of this new field to interested students and scholars. What value is such a survey, especially one that requires a solid acquaintance with received economic theory, likely to have for those interested in the science of administration?

Mueller's book is worth reading for two reasons, one specific and the other more general. While the bulk of the field and the bulk of this book are concerned with the collective decision making that must come prior to the establishment and operation of public organizations, Mueller devotes a chapter to very recent theoretical and empirical work on decision making in public bureaus. The application of standard price theory to the nonprofit, public firm opens up some promising new perspectives on administrative behavior that should be of interest to readers of *Administrative Science Quarterly.* More generally, the public choice approach provides a comprehensive analysis of the context of administrative behavior in the public sector, which should be of interest both for its breadth and coherence and for the possible interdisciplinary linkages that it might help to establish.

The book is divided into two main parts. The first reviews the positive theory of public choice and the evidence bearing on hypotheses about actual behavior generated from it. The second focuses on normative theories about the political arrangements that ought to be established in the light of the preferences about political processes and outcomes of individual citizens. A final section compares these positive and normative approaches. I will attempt to convey the general character of this work by describing briefly some of the salient aspects of positive and normative public choice. I will give somewhat more attention to the positive theory of the government bureau, focusing on some of its implications for administrative behavior.

In positive public choice theory the state is contractarian. Far from having an independent or transcendent existence, it exists to provide those arrangements individuals require but cannot establish for themselves through voluntary exchange. Public goods — law and law enforcement, national defense, protection against third party effects of voluntary exchange — must be funded through taxation if the tendency for individuals to ride free on the efforts of others is to be kept from undercutting their provision. But collective provision requires collective choice. A substantial portion of the positive public choice literature is concerned with voting rules, both under direct and representative democracies.

The standard the literature applies to voting arrangements is Pareto-optimality: the condition that no one can be made better off without making someone worse off. Unanimity is the only voting rule that satisfies this criterion. But over a wide range of communities the cost of achieving unanimity is prohibitive. Rules that require less than unanimous agreement present other difficulties in addition to decision-making costs. Thus, while unanimity insures that forced redistribution of wealth cannot occur, other rules open the possibility for collective action to result in redistribution. Analysis of these rules shows that a simple majority rule is not likely to be optimal except by chance and that under such a rule there may be no way to insure against arbitrary outcomes. This latter result, cycling, stems from the possibility of shifting coalitions aimed at capturing redistributive gains that make majorities and hence outcomes unstable. Another difficulty is vote trading, or logrolling, which can lead to excessive public activity and a concomitant reduction in overall welfare. Much attention has been given to understanding how these rules work and how they could be modified to offset, at least in part, the potential for departures from optimality inherent in them.

These difficulties persist under representative government. The analysis expands to include politicians and parties and develops hypotheses about how parties and legislatures will behave. The dominant view has been that winning elections is the primary aim of politicians and parties. Thus, parties select platforms to win elections rather than winning for the opportunity it provides to implement platforms. Once in office, a calculus of vote maximization is then derived from tax and expenditure proposals generated in large measure by the efforts of organized interest groups. As with direct democracy, cycling remains a threat and logrolling often leads to excessive public activity.

As might be expected, these "naive" models have been challenged as caricatures of political behavior. Public choice theorists answer such criticism by pointing to the performance of these models in predicting relevant behavior. Mueller reviews this evidence and concludes that efficacy of the economic approach to politics remains unsettled. However, much effort is currently being devoted to testing various aspects of the public choice model of democracy. Hopefully, an appraisal of its relative merits is not far off.

Normative public choice theory arises, as it were, out of the infeasibility of the unanimity rule. As we have seen, anything less than unanimity gives rise to the possibility of involuntary redistribution. Positive theory has concentrated on the inefficiencies that stem from majoritarian rules, eschewing the consideration of justice a full treatment of distribution requires. In contrast to this *quid pro quo* approach to the state, normative theory treats the state as an "organic" body and seeks to derive propositions from the community's collectively held values about how distribution ought to be handled. Mueller reviews the literature on these theories — while there is a single positive theory of public choice, there are many normative theories — and finds that, in general, all approaches seem to end with proofs of the impossibility of deriving such propositions. But there is considerably more to this literature than its inability now, if ever, to provide guidance to the policy maker or administrator. The problems of distributive justice it tackles are certainly among the most difficult a democratic community faces. The way it grapples with these problems is at once an illuminating and fascinating addition to a long-standing philosophical tradition.

The provision of public goods is likely to be of more interest to the readers of *ASQ* than the positive and normative properties of the processes by which decisions to provide them are reached. Mueller reviews the small but growing literature on the behavior of government bureaus in Chapter 8, the last chapter in the positive public choice portion of the book. Of this literature, the most germane is that concerning the public bureau, because of its rich implications for the study of administrative behavior in public settings.

The bureaucratic discretion model makes heavy use of the existing economic theories of monopoly and the managerial firm. Thus, the public bureau is typically in a relation of bilateral monopoly with its sponsor, the legislature. Because it produces public goods, those that voluntary market arrangements fail to provide, its output is hard to quantify. What can be observed are activity levels, and these are translated into "perceived," rather than objective, output by the legislature. This translation necessarily gives the bureaucrat a monopoly over information about the costs and technology of the activities he or she manages. The consequence of this special position is that, if the bureaucrat is as egotistical and rational as positive public choice theory takes voters and politicians to be, he or she will use this monopoly to advance his or her own welfare.

The principal way this private utility maximization is carried out in the bureau is by the bureaucrat's bargaining for a budget in excess of that required to deliver the perceived output promised the sponsor. These excess resources are used, in part, to maintain a higher level of activity than the sponsor would wish were it possible for the sponsor to ascertain this discrepancy and, in part, to gain the loyalty and cooperation of subordinates by the distribution of perquisites. This internal diversion of the fruits of bureaucratic self-seeking is necessary, because private appropriation of excess budget funds is ordinarily not possible.

Over a period of time members of the bureaucracy come to have a kind of *de facto* property right in this budget excess. Certainly they are in a position to control its disposition in ways that benefit them, and this control is what is usually meant by property rights. This diversion constitutes an inefficient use of resources both from the voters' and politicians' perspective. However, as a number of writers have argued, there appears to be no easy way to eliminate it completely. If this is so, one can understand administrative behavior as partly directed toward the management of these excess resources to benefit the *de facto* owners of the public bureau. Thus, much of what might appear as confusion, disorder, and failure to effectively pursue announced goals might appear quite orderly and rational from the perspective of those who have vested interests in the disposition of the budget excess.

Testing the bureaucratic discretion model has begun, but as in other areas of positive public choice, much remains to be done before its relative merits can be firmly assessed. Most of the empirical work that has been reported relies on comparisons between the behavior of public and private organizations that provide similar services. But, as has already been noted, public organizations are likely to be engaged in activities for which no private counterparts exist. It seems important, therefore, that the implications of the bureaucratic discretion model be worked out for that large range of cases for which no easy comparisons to private organizations are available. As Mueller notes (p. 155), it is not sufficient for a hypothesis to survive confrontation with data; it must also perform better than its competitors. What is required, then, is to formulate the bureaucratic discretion model in such a way that its implications can be compared with the implications of alternative theories of administrative behavior. It is here that the positive theory of public choice promises the most for those interested in administrative science, since, to the extent that it provides an effective alternative to noneconomic theories of administrative behavior, it provides a richer basis for testing all such theories.

Mueller's coverage of the public choice literature is comprehensive, rigorous, and well written. It conveys the breadth and richness of the field of public choice economics as a comprehensive research program for understanding nonmarket decision making. The strictures that may be raised are likely to be about the field rather than about Mueller's description of it. Reform of the bureaucracy has been a more urgent matter of public business than constitutional reform. Consequently, some may wish that more emphasis had been placed on the analysis of public enterprise. Hopefully, Mueller's fine book will encourage development in this direction.

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Essays in Interpersonal Dynamics.

Warren Bennis, John Van Maanen, Edgar J. Schein, and Fred I. Steele. Homewood, IL: Dorsey Press, 1979. 205 pp. $6.95.

Unlike the three previous editions of *Interpersonal Dynamics,* which contained essays and illustrative readings, the fourth edition is devoted exclusively to essays. A comparison of the first edition, published in 1964, with the new edition reveals that the authors have not incorporated new theoretical perspectives or current empirical research. With the exception of minor changes, the essays by Bennis, Schein, and Steele are the same ones used to introduce readings in the 1964 edition. These essays rely largely on the ideas and research of the 50s and 60s. The only new essays are the two contributed by Van Maanen, which present a symbolic interactionist perspective.

The authors introduce their volume on "incompetent interpersonal relations" by noting that emotions such as love, hate, anger, and sorrow are fundamental to interpersonal dynamics. They fault social scientists for ignoring the fundamental nature of emotions and for considering the topic unsuitable for scientific analysis. Unfortunately, their criticism misrepresents social science research and may mislead the naive reader. An important empirical example to the contrary is provided by the voluminous literature on stress and arousal in general, and more specifically, the research by Lazarus on cognitive control of emotions (Lazarus, Averill, and Opton, 1970). A second major contrary example is the pioneering research by Schachter and Singer (1962) on the impact of the social context on emotions.

To address the book's basic theme of the form and function of interpersonal relations, the authors chose to emphasize qualitative analysis rather than quantitative research. While I applaud their concern for approaching social relationships with analytic tools that do not distort the basic nature of the phenomenon, a more complex and richly detailed analysis of social relationships would have been possible if quantitative studies that complement their approach had been included (e.g., Raush et al., 1974; Duncan and Fiske, 1977). In light of the authors' sense of achievement in their stated 15-year-old goal of making the scientific study of interpersonal relations more central to social psychology, it is ironic that they neglected the current research achievements of social psychologists.

In the volume's first essay, Van Maanen is concerned with the ways in which interpersonal processes structure cognitive views of the world. The social basis of our knowledge and beliefs is emphasized in his lucid discussion of how we use such knowledge to organize, interpret, and explain our behavior and the behavior of others. Van Maanen's perspective is quite consistent with social psychological research on the general process of causal attribution, on actor-observer differences in causal attributions, and on the inaccuracy of self-report explanations of behavior that are based on a priori cultural theories of causality (Nisbett and Wilson, 1977). Consensual social beliefs are contrasted with the emergent realities constructed through ongoing social encounters that define a situation over time and with negotiated realities that emerge when participants exchange discrepant views of a social situation and actively negotiate its definition. Van Maanen's focus is on the dynamic process rather than on static classifications of outcomes. While the perspectives presented will not be new to veteran sociologists, those practitioners, social psychologists, and students whose knowledge of symbolic interactionism is quite limited will find the essay highly stimulating. Researchers who teach qualitative analysis are likely to find the essay a useful addition to assigned readings on social meaning and the problem of differences in the views of participant and nonparticipant observers.

The topic of shared, socially acquired knowledge is followed by a second essay by Van Maanen in which social action is analyzed as a function of the actor's self-concept, the immediate situational context, and general rules as well as situation-specific rules that define expected patterns of action. The social learning basis of self-identity is emphasized in a brief review of the concepts of Cooley, Mead, and Goffman. Next Van Maanen identifies several kinds of routine, transitory, and highly structured social encounters. He concludes with a discussion of the nature and implementation of contextual rules governing social interaction.

In the first of two essays by Bennis, the topic is emotional expression in interpersonal relations. He begins with a discussion of measurement methods and levels of self-awareness of emotions. Schutz's self-report measure of interpersonal orientation (FIRO) is contrasted with observational methods (e.g., Bales' Interaction Process Analysis). A comparison of the strengths and weaknesses of self-rating versus observer-rating methods is presented in terms of levels of awareness. For example, Bennis judges observer scores to be superior for assessing emotions not known to the person but observable by others. Next Bennis discusses sources of conflict, anxiety, and modes of anxiety reduction by comparing psychoanalytic theorists with interpersonal theorists (represented by Sullivan) and existentialist thinkers (such as Rollo May). In the concluding section, Horney's scheme for viewing interpersonal styles as characteristically moving toward others, against others, or away from others is used to launch a discussion of love, hate, and isolation. The ensuing analysis of prejudice and family violence relies heavily on the psychoanalytic perspective to the neglect of empirical research. Accordingly, aggression is viewed as a maneuver to prevent anxiety in the attacker, and target selection is assumed to be determined by unconscious conflicts. Although Bennis notes the importance of knowing more about situational stimuli and individual differences in aggressive reactions, no mention is made of social-psychological research, which has demonstrated the importance of factors such as the actor's emotional arousal, situational cues, and the social meaning that is ascribed to violence, reinforcement-based learning, and the observation of violence, whether real or viewed in the mass media (Geen and O'Neal, 1976).

Following Bennis' essay on interpersonal feelings is an essay by Schein on change through interpersonal relationships, which will be of particular interest to practitioners of organizational development. According to Schein, socialization, education, consultation, and seduction are all examples of the interpersonal influence process that he proposes to explain. The bulk of Schein's essay is concerned with the social-psychological processes of change. These processes are represented in the sequential stages from creation of the motivation to change (unfreezing), through learning new behavioral responses or cognitive labels (changing), to the final stage of stabilization and integration of the newly acquired patterns within the person's pre-existent personality, attitude structure, and behavior repertoire. But while Schein's three-stage model is a useful framework and provocative ideas are abundant throughout the essay, alternative interpretations of phenomena are often absent, and the literature cited is narrowly based, in light of developments in theory and empirical research since the mid-sixties. To illustrate, when discussing mechanisms of change, Schein distinguishes between defensive and positive identification. Defensive identification is evident when the change target is in an involuntary relationship with a powerful change agent such as a prison guard. The prisoner, in this case, adopts in ritualized form the behavior and attitudes of the agent. Accounts of prisoner behavior in Nazi concentration camps are often cited as evidence of defensive identification. Such evidence, however, is incomplete and open to multiple theoretical interpretations, as Bandura (1973) has shown. Similarly, in discussing positive identification and the attributes of effective change agents Schein does not take the opportunity to note the findings of long-standing research on the characteristics of persuasive communicators (Karlins and Abelson, 1970) as well as the now classic research on model attributes and observational learning (Bandura, 1973). The concluding discussion of mechanisms for refreezing new changes lacks the interest, detail, and substance that would have been possible if Schein had drawn upon the literature on the generalization of therapeutic change (i.e., Bergin and Garfield, 1971). The problem of maximizing the generalization of change is as much a concern of the therapist who institutes a behavior modification program as it is of the practitioner who is engaged in organizational development.

The instrumental relationships, a special class of relations in which the goal is the performance of a task, is the topic of the volume's fifth essay, written by Steele. Throughout much of the essay, Steele focuses on four types of instrumental relationships and the interpersonal difficulties inherent in each type. The typology is based on two dimensions: friendly-antagonistic and cooperative-competitive. Steele speculates on the nature of task and socioemotional difficulties of his four types of relationships: friendly-cooperative, antagonistic-competitive, friendly-competitive, and antagonistic-cooperative. He concludes with a discussion of the facilitative effects of interpersonal trust in the production of creative, high quality products. The Steele essay presents little that would be considered new or provocative by the social scientist or by the well-trained practitioner.

The sixth and final essay, written by Bennis, focuses on improving interpersonal relationships. In an effort to define a good relationship, Bennis identifies four possible functions of relationships. These include: emotional expression, collection and verification of information about oneself and the social environment, change, and task completion. A relationship is good, according to Bennis, to the extent that it satisfies its primary function, whether that is satisfaction, consensus, change, or productivity. He concludes his essay, and the entire volume, by outlining the social conditions and personal skills conducive to formation and maintenance of good relationships across the four functions. Personal competencies required for a good relationship include the ability to accurately send and receive emotional information. The facilitative social conditions are interdependence among partners, decision making on the basis of consensus rather than fiat, a goal that is intrinsically motivating, and openness to influence from the external environment.

Overall, I wish that the authors were themselves more open to influence from the external environment, in this case, the research literature of social psychology over the past 15 years. It is clear that the contributions they made in the mid-sixties are important enough so that they are now recognized as classic. The ideas presented here are thus of considerable historical as well as intrinsic interest. Although the authors claim to have surveyed "new and fresh developments," for whatever reasons, they have not included many of the important developments in interpersonal relations over the last two decades. Contrary to the authors' assertion, their book is not a "new textbook that had virtually no correspondence between it and its three ancestors." This text is therefore of limited value as a presentation of current thinking and research for today's student. Adoption of this text would mean that instructors would need to supplement this volume with one that is far more up-to-date.

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Organization in Innovation, Innovation in Organization.

Cornelius Buitenhuis. Assen, The Netherlands: Van Gorcum, 1979; Atlantic Highlands, NJ: Humanities Press. 158 pp. $14.00, paper.

It sometimes seems that little has been written about innovations in organizational settings that carries much beyond the ideas presented several decades ago. Perhaps this is because individuals directly involved with innovating in their organizations write, if at all, for "practitioner" journals and trade association publications; academic researchers write for their peers; seldom does anyone write for both researchers and practitioners at the same time. Dr. Buitenhuis has attempted to reach both audiences with this volume, and in that sense alone the work represents an ambitious undertaking. In addition, it represents one of the very few systematic studies of industrial innovation.

The central theme of the book, implied by the title, is that to be successfully organized for technological innovation requires an organization to be innovative in terms of its structure. That is, the innovative organization requires a structure in which functional and technological development will act as a mutual stimulus to innovation. This suggests, to the author, a matrix form of organization designed to bring technologies and functional "centers" of the system together in adaptive ways. This matrix will be open to its environment — highly receptive to and oriented toward change.

The book is divided into three major sections consisting of eight chapters. Part I contains a brief literature review, some philosophical background, including a description of the setting used, a presentation of working hypotheses, and a description of methodology (essentially participant observation). The review of selected literature on organizations and innovation, however, is oddly disjointed and difficult to follow without some familiarity with the original sources.

Part II contains three case studies of innovation at N. V. Philips' Gloeilampenfabrieken, a diversified manufacturer and distributor of electronic products, which the author describes as a two-dimensional matrix — with products and countries representing the dimensions. At the time of the study, the firm had 14 product divisions and 58 national organizations. All three case studies deal with problems related to the interaction of technical and functional developments during the innovation process. One of the more exciting aspects of these cases is that, among them, they cover all stages in the conceptualization of a new product in a high technology industry — from the initial idea to large-scale production. The first case concerns research into the viability of magnetic bubbles as computer memory devices. A second case involves the development and production of integrated circuits, while the third concerns the use of modular subassemblies in an item of electronic equipment and the effects the subassembly had on the supporting service organization (repair shops). Part II closes with an analysis and summary of results from the three cases. The author reached a number of conclusions about innovation based on characteristics common to the studies:

1. Innovation occurred because the organization was confronted with "questions" from its environment evoked by opportunities for new technology.

2. This technological imperative led to search behavior on the part of task groups, who interacted with various "interested parties" from their environment in an attempt to develop or take advantage of some technological innovation.

3. These interactions had a way of evolving into a sort of "matrix" that was seen as more effective than single-project or traditional line-staff organizational forms.

4. This matrix represents an interaction of technology and function. Thus, the technological innovation led to a change in structure that in turn supported, in a symbiotic way, the change in technology.

Part III presents the author's concluding observations and, in a sense, is the real heart of the book. Buitenhuis describes three innovation process models: a "search" model for basic research, an "application" or "implementation" model for applied research, and a "spiral" model that supposedly enables technology and function (or structure) to exert optimum influence on innovation. The first two models represent, as the names suggest, search and implementation processes. These processes differ in the same sense that basic research differs from applied research. However, in a changing, high-technology industry there is a complex interaction between basic and applied efforts — that is, a shifting back and forth between technological research aimed at new products or processes and the exploration or research of new "functions" to implement the technology. Thus, a third type of process, the spiral model, describes this sequence with its interaction of technological development and the development of functional units (structure) to exploit the "product." The spiral model is championed as that which fits or perhaps typifies the matrix organization and thus is viewed as the process through which a technology/function matrix innovates. Indeed, a "product" comes into being as an innovation *as the result of* the interaction between technology and function. The matrix organization increases the probability of this interaction, that is to say, of innovation.

Finally, the author argues that the innovation process must be controlled and managed through management "interventions." Management provides the connecting links between innovation teams and the "user environment," both inside and outside the organization. Management intervenes to bring together a number of information, power, and technology centers so the "spiral" process can work to optimum effect. Buitenhuis argues that the relevant points of contact or appropriate connecting links can be discovered in a particular organization by systematic research.

The reader expecting a rigorous, empirical evaluation of innovation will be disappointed. The hypotheses seem to be utilized, much as my tennis serve, merely to put the ball into play. After their introduction, they are referred to only indirectly in the remainder of the study. The cases are systematically analyzed using a format designed to place them within a common comparative framework. This analysis is well done and quite helpful. Nevertheless, we are dealing with case material — with no measures to support or refute the predicted relationships. Of course, it is not quite fair to criticize the author for the study he did not do. Yet, Part I of the book whets the reader's appetite, leading one to expect a banquet prior to the delivery, in Part II, of a sandwich.

Overall, this is a work rich in meaning and ideas, many not touched on by this review. It is a work that could stimulate, as a good case-study should, insights and hypotheses for rigorous examination. The book is potentially valuable also from the practitioner's or innovator's perspective. It is obviously intended to provide workable ideas in terms of organizing for innovation.

Unfortunately, much of the wisdom in the book is well hidden and it yields information only grudgingly after several readings. Some readers, of course, may find that a challenge, but I fear many will simply give up — particularly since the first of the book is less clearly written than later chapters.

Part of the blame for the difficulty in reading perhaps can be laid at the door of the publisher, for there are numerous typographical errors in the text — at one point a paragraph simply stops in mid-sentence. A more serious source of clarity problems is possibly due to translation difficulties. One hesitates to criticize the work on these grounds. After all, it is no fault of the author that I cannot read the book in its original language (Dutch). Nevertheless, one suspects that poor translation has contributed to a lack of clarity. The book is written in an awkward, ponderous style that is ungrammatical in places: "Integration can then be promoted when project leaders come from both the development sectors and the user's sectors reporting to a joint manager can promote integrated teamwork." Or consider this as a complete sentence: "If the appropriate information is channelled to them."

In sum, the book contains insights into innovation in a high-technology industry that are likely to be of general interest to innovation managers. In addition, there are theoretical assertions with some (albeit limited) support that are likely to interest researchers of innovation phenomena. However, only the most stubborn readers will persist long enough to appreciate the full impact of the work. Had I not promised to review the book, I probably would not have read the entire manuscript, despite a strong general interest in the area.

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Measuring and Assessing Organizations.

Andrew H. Van de Ven and Diane L. Ferry. New York: Wiley, 1980. 552 pp. $32.50.

One of the most encouraging developments in the study of organizations during the last decade has been the increased concern with measurement. Prior to 1970 one had to search diligently to locate first-rate research primarily devoted to measurement; today, there is an abundance of such research. The book by Van de Ven and Ferry is a sophisticated example of this new abundance.

The major focus of the Van de Ven and Ferry book is a description and evaluation of a research instrument — termed the "Organizational Assessment Instrument" — developed between 1972 and 1979. Three types of properties are measured by the instrument: context, design, and performance. Organizational domain is an example of a contextual property, administrative intensity is an example of a design property, and effectiveness is an example of performance. These properties are examined from four perspectives: organization, work unit, job, and interunit relations. Fifty-one indices are presented. Most of the research to evaluate the 51 indices was conducted in 30 local offices of a state employment agency. The 30 local offices consisted of 1,670 employees distributed among 334 work units. Fourteen local community child care programs were used to evaluate those parts of the Organization Assessment Instrument that focus on interunit relations.

Each index is evaluated for intrinsic and extrinsic validity. The intrinsic validity "of an instrument refers to how well it measures what it is intended to measure in a consistent manner," whereas extrinsic validity describes "the practical usefulness of the instrument in addressing the basic research or applied problem with which it was intended to deal" (p. 77). The procedures used to evaluate the intrinsic validity of the Organization Assessment Instrument are factor analysis, indices of internal consistency, discriminant validity, and correlations of selected dimensions with parallel measures. Extrinsic validity was evaluated in three ways: (1) The indices were interrelated to determine how well observed correlations corresponded with theoretically expected patterns of relationships among the properties. (2) Analyses of variance on the indices were computed to ascertain how well the indices discriminated between different types of work units, jobs, and interunit relations. (3) Correlation and multiple regression analyses were used to determine the percentage of variation in performance that was explained by the indices.

The primary value of the Van de Ven and Ferry book is the Organization Assessment Instrument. Three strengths of the instrument are noteworthy. First, definitions and examples are provided for all the properties measured. One does not have to infer definitions from a mass of discursive material; everything is clearly stated. Appendix A is an extra aid in this regard since it contains a compact discussion of all properties and a general indication of how they are measured. The actual instrument is contained in Appendices B through E. Second, the indices are very carefully evaluated and, all in all, are found to possess satisfactory intrinsic and extrinsic validity. Suggestions are also advanced for improvements at those points where the instrument is found to be inadequate. Third, although most of the indices are based on subjective data (questionnaires in this instance), some of the indices, especially those designed from an organizational perspective, make use of objective data such as organizational charts.

The book also has some notable secondary strengths. Since 51 indices are developed and since part of the evaluation of each index is its agreement with the relevant literature, the book, in effect, constitutes a review of the field of organizational studies. Especially notable in this regard are the findings on the three performance concepts, effectiveness, efficiency, and job satisfaction. The book essentially presents a model explaining these three performance properties. In addition, much of the existing knowledge about organizational measurement is compactly and accurately summarized. For example, one learns, or is reminded, that judgments about organizational behavior are influenced systematically by the position of the respondent. The authors also point out that objective measures are not totally different from subjective measures and that the former, like the latter, are characterized by limitations. Further, the data are summarized concerning the appropriate number of response points for questionnaire items. Most of the gains in reliability are achieved with five points. In the course of the book, a number of very hopeful conceptual points are advanced. The properties, for instance, used to describe interunit relations were especially stimulating.

It is evident that Van de Ven and Ferry required an immense amount of effort from the two organizations they studied. Anyone who has ever done this type of empirical research can only marvel at the cooperation they received from those organizations. One source of their success, in addition to the fact that the organizations helped to fund the research, appears to have been the care with which Van de Ven and Ferry involved the organizations in the research project. This is truly a "participative project." There is a lot to be learned from this book on how to motivate respondents to cooperate with a research project.

Two issues are raised by the book. The first issue pertains to the strategy of measurement research. As previously indicated, Van de Ven and Ferry describe and evaluate 51 indices. This is an immense undertaking that requires a very brief treatment of a great many very complex topics. Much of the extensive literature about professionalism and administrative intensity, for example, is ignored due to the large scope of the book. Future research on organizational measurement should probably focus on fewer properties. The second issue pertains to the complexity of the list of properties used to characterize the organization, work unit, job, and interunit relations. Although complex organizations are complex, to adopt the phrasing of the authors, the list of properties used to describe the organizations should be relatively simple. Van de Ven and Ferry have struggled mightily with this issue and, like others in the field, have not succeeded too well. The conceptual apparatus — the list of properties — is just too complex.

It is safe to say, however, that *Measuring and Assessing Organizations* will occupy a dominant place in measurement research during the 1980s. The book deserves such eminence.

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Listing here does not preclude a subsequent review.

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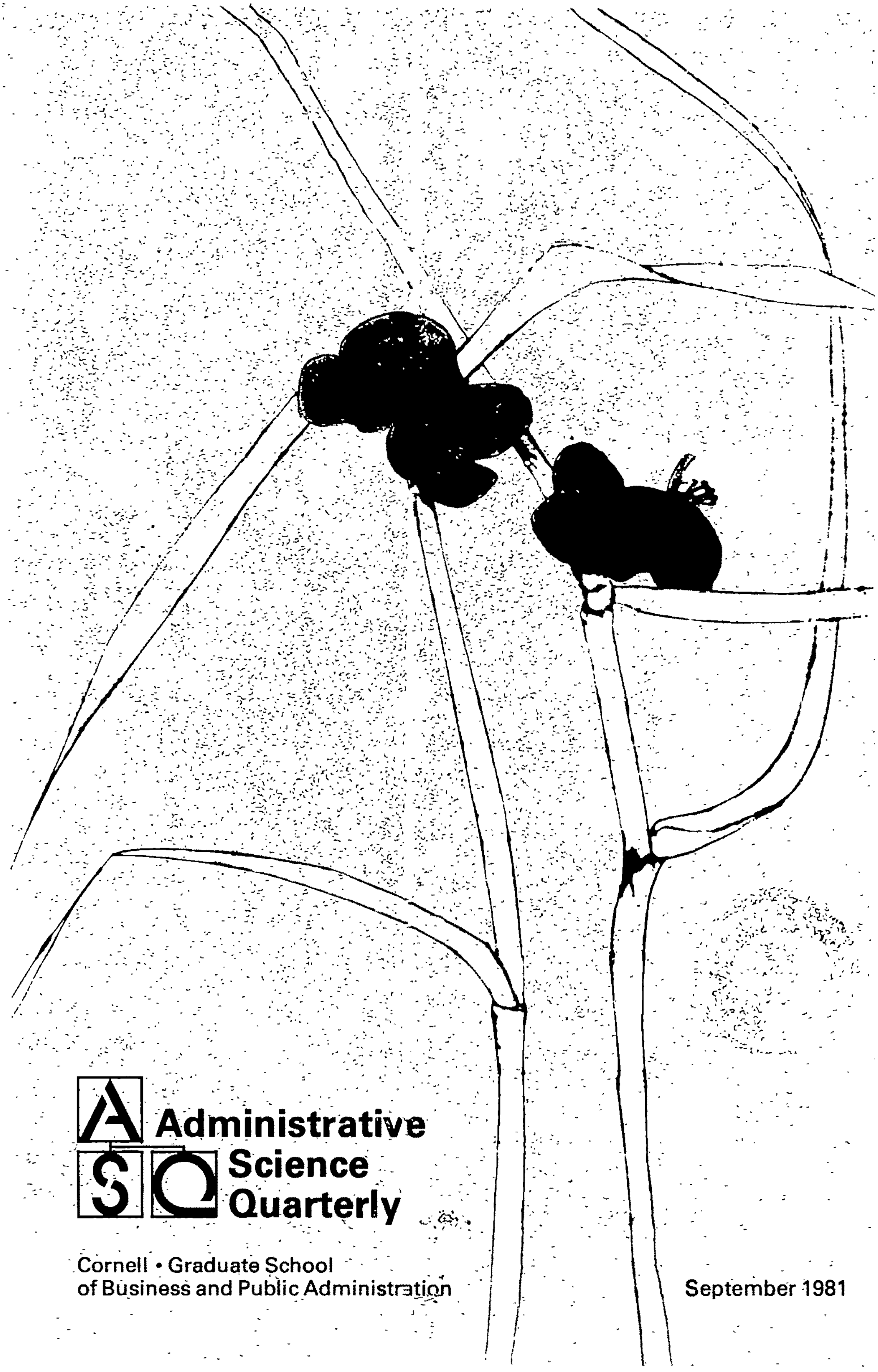

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Structural Relationships, Job Characteristics, and Worker Satisfaction and Performance

Daniel J. Brass

This research investigates the role of job characteristics as possible mediating variables in the relationships between the organization's structural context and the attitudes and behaviors of individual employees. The organization is conceptualized as a network of task positions interrelated on the basis of workflow transactions. Three structural relationships of task positions are investigated: (1) the centrality of a task position; (2) the degree to which a task position is critical to the workflow; and (3) the transaction alternatives available to a task position. The results indicate significant relationships between these three relational measures and job characteristics. Further, the findings support the hypothesis that job characteristics mediate the relationship between structure and individual responses.•

While a great deal of research has been devoted to remedying the problems associated with over-simplified, boring work, most of the approaches have focused exclusively on the individual worker and the content of his or her work. This "one person-one task" approach to job redesign has virtually ignored the structural organization in which tasks and workers are embedded. Only recently, researchers interested in bridging the traditional micro-macro gap in organizational behavior and theory have begun to view the characteristics of jobs as possible links between the organizational context and individual responses. For example, Rousseau (Rousseau, 1977, 1978a, 1978b; Sutton and Rousseau, 1979) found that job characteristics mediate the relationships of organizational, departmental, positional, and even environmental characteristics to individual responses.

The notion that organizational context may impact on job characteristics is not a new one. Several researchers have noted empirically the links between organizational attributes and job characteristics, and some have suggested a theoretical rationale to explain these relationships. In an extensive review of this literature, Jones and James (1979) summarized this research in terms of three broad categories. The first category concerned the relationships between technologies and job characteristics. In general, researchers have hypothesized that more complex, uncertain, or nonroutine technologies will be associated with higher levels of task variety, autonomy, challenge, and task significance.

The second category included hypotheses that relate job characteristics to variables describing distributions and relationships among subunits or positions. Jones and James referred to such variables as reflecting "anatomical" structure (1979: 209). Large size, tall configurations, high division of labor, and large spans of control are viewed as leading to routine, monotonous, low-skill jobs.

The third category dealt with relationships between "operational" structure (centralization, formalization, standardization) and job characteristics. It has been hypothesized that high levels of operational structure will be associated with non-challenging jobs. For example, recent studies by Pierce and Dunham (1978) and Oldham and Hackman (1981) showed that measures of centralization and formalization relate negatively to such job characteristics as autonomy and variety.

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• This research is based in part on a Ph.D. dissertation completed by the author while a student at the University of Illinois. The author wishes to express his deep appreciation to his committee, Greg Oldham (Chairman), Michael Moch, and Charles Hulin. Hank Sims and Denise Rousseau also provided helpful comments on an earlier draft.

The present study attempts to extend and refine this line of research by investigating the possible mediating effects of job characteristics on the relationship between structure and individual responses. It is hypothesized that the structural context in which task positions are embedded and the relationships that result among interdependent task positions will be associated with job characteristics. These job characteristics will, in turn, relate to individual worker satisfaction and performance. These hypotheses are tested within a framework that does not rely on traditional measures of organizational structure. Rather, a relational, network perspective of organizational structure is adopted.

Structural Context: A Network Perspective

The organization is conceptualized as a network of interrelated task positions. This conceptualization is based on the assumption that each individual job is embedded in a larger organizational structure. This structure develops as activities are differentiated — different workers are assigned different tasks. Because the overall organizational task is subdivided, the differentiated tasks and the workers assigned to perform these tasks are interdependent. Each task is in some way related to other tasks. Although most of the previous studies employing intraorganizational network analyses (see reviews by Rogers and Rogers, 1976; Roberts and O'Reilly, 1979; Moch, Feather, and Fitzgibbons, 1981) have focused on communication patterns as the basis on which individuals or groups are interrelated, the present research focuses on workflows. That is, task positions and the workers occupying those positions are viewed as being interrelated on the basis of the flow of work through the organization.

The organizational workflow is viewed as a network that locates task positions in relation to each other. The basis for the relationships or interdependencies among different positions is the patterned interactions that occur between related positions as the work flows through the organization. The holders of these task positions, the individual workers, acquire inputs from task positions preceding them in the workflow and distribute outputs to task positions following them. The processes of acquiring inputs and distributing outputs link together related task positions and are the bases for interdependencies among them. These workflow transactions (acquiring inputs and distributing outputs) recur on a regular basis, and thereby establish a rather stable network — an integrated structure. Because each link in this structural network represents the acquisition of inputs by one worker and, at the same time, the distribution of outputs by another worker, the link is viewed as a mutual interdependency.

The structural network therefore refers to the arrangement of differentiated task positions into an integrated workflow. Rather than focusing on isolated individuals or work groups, this structural network notes interdependencies that may cross formal group boundaries or even organizational boundaries. While a particular task position may be independent of another particular position (that is, no workflow interactions occur between the two), no position can be described as totally independent of all other positions.

Structural Relationships

In summarizing much of the literature on structure, James and Jones (1976: 76) concluded that structure may be defined "as the enduring characteristics of an organization reflected by the distribution of units and positions within an organization and their systematic relationships to each other." Consistent with this definition, structure is here defined as the arrangement of differentiated task positions into an integrated workflow and the relationships that result from this arrangement. These structural relationships, and their possible effects on both job characteristics and worker satisfaction and performance, are the focus of this investigation. Three structural relationships are investigated: (1) centrality, (2) criticality, and (3) transaction alternatives.

Centrality refers to the extent to which a worker's task position is central to the workflow network. A worker occupying a central position can "reach" all other task positions via a minimum number of workflow connections or links. This may be the result of the position being highly interconnected (it has many workflow transaction links) or because it is located at the geographical center of the network rather than at the periphery.

Criticality refers to the degree to which a worker's task position is critical to the continued flow of materials (inputs and outputs) through the workflow network. If the removal of a task position, and its direct workflow links, breaks the workflow chain, the position is described as highly critical. However, if several other task positions can accommodate the acquisition of the same inputs or distribution of the same outputs when the focal position is removed, the focal position is described as being low on the criticality dimension.

Transaction alternatives refers to the number of different positions available to a task position for the acquisition of the same inputs or the distribution of the same outputs. A task position may have several sources of inputs, but each source may provide a different necessary input. In such a case, the task position is described as being low on the transaction-alternatives dimension. Such a position has only one source, rather than many, for each of its necessary inputs.

While measures of these structural relationships can be assigned to individual task positions, and to the particular workers occupying such positions, it is important to note that the relationships are not attributes of an analytically isolated position or person. They are relational concepts and measures. Each is defined by relationships to other task positions, each is a direct function of the arrangement of other task positions, and each is altered by a change in the location of other task positions.

Job Characteristics

Included in this research are the five Hackman and Oldham (1975, 1976) job characteristics: skill variety, task identity, task significance, autonomy, and task feedback. Because the Hackman Oldham model was primarily concerned with the relationship between the individual worker and the content of the worker's task, various interpersonal variables noted by others (Turner and Lawrence, 1965; Hackman and Lawler, 1971; Rousseau, 1977) were not systematically included within that model. In the present paper, two interpersonal variables, task support and feedback from agents, are included.

The task-support variable, while not previously identified, was drawn from the writings of a number of sociotechnical researchers (Rice, 1958; Emery, 1959; Bucklow, 1972; Engelstad, 1972). Task support refers to the degree to which the persons an individual must work with (supervisors, co-workers, clients, etc.) provide active support, help, and cooperation to the individual in the performance of his or her task. That is, this variable describes the degree to which others pitch in to help get the job done.

Feedback from agents concerns work performance. The variable has three dimensions that reflect source of information: (1) supervisors, (2) co-workers, and (3) others (including clients, customers, and friends).

Satisfaction and Performance

In order for the nine job characteristics to mediate the relationship between structure and individual responses, one necessary but not sufficient condition is that the job characteristics relate significantly to the individual responses. Extensive reviews of the literature on job design (Pierce and Dunham, 1976; Steers and Mowday, 1977; Dunham, 1979) concluded that the five Hackman and Oldham dimensions consistently relate positively to worker satisfaction. Previous research also showed that accurate feedback from external agents relates positively both to worker satisfaction (Hackman and Oldham, 1975; Rousseau, 1977; Kim and Schuler, 1979) and to worker performance (Annett, 1969; Locke, Cartledge, and Knerr, 1970; Cummings, Schwab, and Rosen, 1971; Steers and Porter, 1974).

Although the task-support variable has not been previously tested, a similar variable — labeled "coordination" by Rousseau (1978b) — related positively to job satisfaction. It is expected that task support will relate positively to worker satisfaction and performance. For example, a general feeling of lack of support from others may lead to decreases in satisfaction and to a less than optimal effort. On the other hand, when an individual feels that everyone is pitching in and working together to achieve the task demands, his or her own performance and satisfaction may increase.

Hypothesized Relationships between Structure and Job Characteristics

In order for the job characteristics to mediate the relationship between structure and individual responses, a second necessary but not sufficient condition must be met. The structural relationships must relate significantly to the job characteristics. The following hypotheses were generated to explain the link between structure and job characteristics.

Centrality. Laboratory research on small groups indicated that persons occupying central positions in the network were rated as more influential and were more satisfied with their tasks than were persons in peripheral positions (Leavitt, 1951; Shaw, 1964; Davis, 1969). The explanation for the positive relationship between centrality and satisfaction is that central positions are more autonomous (Leavitt, 1951; Trow, 1957; Mulder, 1959; Shaw, 1964). Leavitt (1951) argued that a person in a central position will be viewed by himself and others as having the greatest problem-solving potential. Laboratory findings indicated that persons in central positions are more often perceived or selected as leaders of the group (Shaw, 1964; Cartwright and Zander, 1968). With this research in mind, it is hypothesized that centrality within a subunit, department, or entire organization will be positively related to autonomy.

In addition, tasks performed by persons in highly central positions may have more of an impact on others than do tasks performed in isolated, peripheral positions. Due to the reachability of the central position to many other task positions, tasks associated with central positions may take on added significance. If, in fact, the performance of centralized tasks affects many other positions, persons occupying centralized positions would likely receive more feedback from agents than would persons occupying peripheral positions. Furthermore, the tasks associated with a highly centralized position may require a greater variety of skills and talents, particularly interpersonal talents for dealing with a large number of surrounding or easily reachable position holders. Consequently, the following hypothesis is made: Centrality within a subunit, department, or entire organization will be positively related to task significance, feedback from agents, and skill variety.

Criticality. In the case of a highly critical task position (for which few, if any, alternative workflow routes exist), the acceptance of outputs from positions prior to it in the workflow and the release of needed inputs to following positions may have a substantial impact on others in the workflow. The failure of a worker in a highly critical position to perform these input-output functions may disrupt the entire workflow. Supervisors, co-workers, and others may therefore be quick to provide a critical task position holder with performance feedback and assistance when problems arise. It is hypothesized that criticality will be positively related to task significance, feedback from agents, and task support.

The lack of alternative workflow routes associated with a highly critical task position may also be a source of autonomy. Other workers may not be able to make demands that limit the discretion of the holder of a highly critical position, for they have few alternative routes to follow if the demands are not met. It is therefore hypothesized that criticality will be positively related to autonomy.

Transaction alternatives. A task position holder with a high number of transaction alternatives may be able to choose those that will provide him or her with active support in the completion of the task. Task position holders with few transaction alternatives will be forced to deal with the available position holders regardless of the amount of task support that they offer. Likewise, when few alternatives exist, it is unlikely that the position holder will be able to demand and obtain task support. He or she will not be able to "go elsewhere" in order to acquire needed inputs or distribute outputs. Consequently, it is hypothesized that transaction alternatives will be positively related to task support.

Additional Research Questions

This investigation is not confined to testing the hypotheses stated above. The suggested model, that structural relationships relate to job characteristics which in turn relate to individual responses, is used as a guide for the exploration of other research questions. For example, do the structural relationships relate significantly to job characteristics that were not included in the hypotheses?

In addition, it is possible that the structural relationships may have a direct effect on individual responses, apart from any significant relationship they might have with the job characteristics. For example, workers occupying central positions in the structural network may enjoy high visibility and a strong feeling of inclusion in the organization. Such feelings may produce a positive relationship between centrality and satisfaction, apart from any relationship between centrality and the particular job characteristics.

From a power perspective, such as that suggested by Emerson (1962) or Thibaut and Kelley (1961), increasing one's transaction alternatives could be viewed as decreasing one's dependence or, conversely, as increasing one's power. That is, having many transaction alternatives assures a position holder of not having to deal with task positions that are highly critical. The result may be a positive relationship between transaction alternatives and satisfaction, in addition to any positive effects transaction alternatives may have on the job characteristics. This research explores such possibilities.

METHOD

Procedure

The research was conducted in a newspaper publishing company in the midwest (newspaper circulation approximately 70,000). The data collection consisted of three phases that covered a six-week period. Phase 1 consisted of a two-week period of observation and interviews with key supervisory personnel. Phase 2 covered the following two weeks and involved the administration of questionnaires to both supervisory and non-supervisory personnel. Questionnaires were administered by the researcher (author) to groups of employees (supervisory or non-supervisory), ranging in number from two to twelve, in a room away from normal work stations. Respondents were assured that individual responses would be held in strict confidence and would be used for research purposes only. Phase 3 involved additional observation and interviews during the two weeks following the administration of questionnaires.

Participants

Of the 160 full-time, non-supervisory employees, 143 filled out the Employees' Questionnaire. Three of these questionnaires were incompletely answered. The 140 completed questionnaires represented a response rate of 87.5 percent. All of the immediate supervisors of the 140 employees completed the Supervisory Questionnaire.

Measures

Emphasis was placed on obtaining multiple measures from independent sources. With the exception of the measures of employee satisfaction and performance, measures of variables were obtained from at least two independent sources.

Constructing the structural network. Diagrams representing the workflow interdependencies were obtained in two ways. The first involved researcher observation and interviews with key supervisory informants during Phase 1 of the research. After a series of initial interviews, the researcher spent more than 100 hours observing the workflow transactions in the organization. Rather than attempting to draw a structural network, the researcher listed sources of inputs and destinations of outputs by individual task position.

In addition to the researcher's observations, the structural network was measured through questionnaire items during Phase 2. On the Employees' Questionnaire, examples of inputs and outputs were given, and employees were asked to list the sources of their inputs and destinations of their outputs. Employees were asked to list names of sources and recipients whenever possible.[1]

The lists generated by the employees were evaluated in terms of "reciprocated choices." A reciprocated choice exists when Person A lists Person B as the source of an input, and Person B lists Person A as an output destination. In other words, the people listed by Person A as sources or destinations should list Person A as a destination or source, respectively. Of the total number of possible reciprocations, 84 percent were reciprocated (persons who were listed but did not themselves fill out an Employees' Questionnaire were not included as possible reciprocations).

The employees' lists were then compared with the lists compiled by direct observation. Of the possible transactions listed by the researcher, 77 percent were listed and reciprocated by employees, and 82 percent were listed by at least one employee. Of the transactions listed by employees, 83 percent were also listed by the researcher.

Because the structural network is at the heart of this research, and because all the structural relationship measures are derived from it, all discrepancies between researcher and employee lists had to be resolved. This was done during Phase 3 through interviews with the parties involved. These interviews also pointed out the causes of the discrepancies. In most cases, the cause was one of the following: (1) the researcher observed an exceptional case — a transaction that did not occur on a daily, routine basis; (2) the employee had many sources and destinations and simply forgot to list one; (3) the researcher failed to observe a transaction; (4) the researcher and the employee failed to agree on the nature of the inputs or outputs; or (5) the researcher associated the wrong name or task position with a person. Following the resolution of discrepancies, a structural network was diagrammed by the researcher.

As was anticipated, it was practically impossible to observe transactions with non-members of the organization that occurred in locations outside the organization. The basis for including such transactions in this research comes largely from the employee lists and from interviews conducted during Phases 1 and 3.

---

[1] Questionnaire items used in this study are available from the author upon request.

It should also be noted that sources and destinations are not always identifiable, individual persons. For example, one source of inputs for some reporters was the Associated Press wire service. This was treated as one source, although it includes hundreds of Associated Press workers. Alternative sources of the same inputs, in this case, are other wire services such as United Press International or *The New York Times.*

Structural relationships. Measures of the three structural relationships were derived from the structural network diagram.

Centrality. Three separate indexes of centrality were formed. These indexes represented the centrality of task position within the entire organization and within the department and subunit in which the position was located. Departments corresponded to the organization's formal designations, and a subunit included all non-supervisory personnel with the same immediate supervisor.

Centrality was operationalized as the minimal distance between a task position and all other positions in the organization, department, or subunit. The distance was measured by counting the number of workflow links between the focal position and each other position in the subunit, department, or organization. The sum of the distances to all the other positions in the subunit, department, or organization formed the corresponding index of centrality. Because the size of a subunit or department will directly affect the sum of distances, centrality indexes were divided by the size of the subunit or department so that comparisons could be made across subunits and departments. The organization centrality index was divided by 160.

Criticality. The index of criticality was formed by counting the number of alternative routes through which the work may flow once the focal position is removed. The greater the number of routes, the lower the criticality of a focal position. These scores were transformed so that a high score reflected high criticality.

Transaction alternatives. An index of transaction alternatives was calculated by counting the number of task positions available to the focal position for the acquisition of inputs or distribution of outputs. This number was then divided by the total number of input-output links in order to obtain an average score for each focal position. No distinction was made between input and output transaction alternatives.

Means, standard deviations, and intercorrelations for the structural relationship indexes are presented in Table 1. Only one of the intercorrelations is greater than .30, which indicates the relative independence of the different structural relationship measures. The exception is the strong negative correlation between organizational centrality and criticality.

Job characteristics. Measures of Hackman and Oldham's five job characteristics (autonomy, task identity, skill variety, significance, and task feedback) were obtained in three ways. First, three items concerning each characteristic were included in the Employees' Questionnaire. These items were identical to the

Table 1

Means, Standard Deviations, and Intercorrelations for Structural Relationship Indexes (*N*=140)

Structural Relationships	Mean	S.D.	1a	1b	1c	2
1. Centrality						
a. Subunit	1.61	0.44				
b. Department	2.46	0.97	.13			
c. Organization	3.07	0.71	−.29**	.27**		
2. Criticality	3.91	3.49	.30**	.05	−.44**	
3. Transaction alternatives	3.85	2.46	−.06	.18*	.03	.04

*$p \leq .05$, **$p \leq .01$

Job Diagnostic Survey (JDS) questions described by Hackman and Oldham (1974). The internal reliability estimates for the employee ratings of the job characteristics ranged from .74 to .90, with a median estimate of .84. The employee responses on the three items were combined to form an average measure of each job characteristic.[2]

A second source of measures of these five job characteristics was provided by responses to items in the Supervisory Questionnaire. The format for rating the job characteristics on the Supervisory Questionnaire was slightly different from that of the normal JDS supervisory rating form. In the present study, one item for each job characteristic was used. For each item, the immediate supervisor rated the extent to which the characteristic was present in the job of each of his or her subordinates. This method of rating jobs individually was chosen because of the variety of different functions performed by subordinates with the same job title and the same immediate supervisor. If ratings of job characteristics are to be useful in predicting an individual's behavior or attitudes, ratings must be made for each individual job holder (Jenkins et al., 1975).

To obtain the third measure of job characteristics, the researcher used a form with one item for each of the five characteristics. On the basis of direct observation during Phase 1, the researcher rated each job characteristic for each task-position holder.

A multitrait-multimethod correlation matrix (Campbell and Fiske, 1959) was constructed, with the five job characteristics representing the multitraits, and the average employee ratings, supervisor ratings, and researcher ratings representing the multimethods. The across-methods correlations for each trait ranged from .50 to .83, with a median correlation of .79. These values indicate substantial agreement among employees, supervisors, and the researcher on each of the five job characteristics. These convergent validity coefficients were substantially higher than correlations for different traits (job characteristics) within the same method. Because the employees', supervisors', and researcher's ratings of each job characteristic were similar, they were combined to form an average measure of each characteristic.

Task support. Seven items were included in the Employees' Questionnaire to measure task support. Because these items were found to have a high reliability estimate (.93), they were averaged to form an average employee rating of task support. One item on the Supervisory Questionnaire asked immediate supervisors to rate the degree of task support received by each of the persons they supervised. The supervisor rating and average employee rating were highly correlated (.67), and so they were averaged to form an overall measure of task support.

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[2] All ratings of job characteristics, satisfaction, and performance were made on Likert-type scales (1 = low; 7 = high).

Feedback from agents. Nine items were included in the Employees' Questionnaire to measure feedback from agents, three items for each feedback source (supervisors, co-workers, and others). The three-item scores for each source were found to have high reliability estimates (.92, .83, and .89, respectively) and were therefore combined to form an employee average score for each source. Feedback from agents was also measured with three items on the Supervisory Questionnaire. The immediate supervisors were asked to rate the extent to which each employee received feedback from supervisors, from co-workers, and from others. The correlations between the supervisor ratings and average employee ratings were .69 (feedback from supervisors), .42 (feedback from co-workers), and .66 (feedback from others). The supervisor ratings and the average employee ratings were averaged to form overall measures of the three feedback variables.

Satisfaction and performance. Six items, taken from the JDS (Hackman and Oldham, 1974), were included in the Employees' Questionnaire; three items measured general satisfaction, and three measured satisfaction with supervisors. The internal reliability estimates were .79 for general satisfaction items and .90 for supervisor satisfaction items. For each measure, an overall average of the three items was calculated.

Measures of employee performance were obtained by having the immediate supervisor rate the effort, quality, and quantity of performance of each of his or her employees. High intercorrelations among the three items (internal reliability estimate of .87) warranted the combination of the scores to form an average measure of performance for each employee.

Table 2

Means, Standard Deviations, and Intercorrelations for Averaged Measures (*N*=140)

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11
1. Autonomy	4.94	1.37											
2. Task identity	4.44	1.32	.47*										
3. Skill variety	4.98	1.18	.53	.26									
4. Significance	5.55	0.96	.45	.27	.46								
5. Task feedback	5.39	0.89	.39	.18	.42	.43							
6. Task support	5.26	1.05	.18	.25	.13	.19	.20						
7. Feedback from supervisors	4.12	1.44	.33	.24	.33	.22	.47	.32					
8. Feedback from co-workers	4.10	1.07	.24	.13	.37	.35	.20	.09	.34				
9. Feedback from others	3.86	1.57	.47	.28	.44	.46	.39	.06	.28	.44			
10. General satisfaction	5.20	1.41	.25	.25	.20	.18	.14	.60	.41	.14	.07		
11. Supervisor satisfaction	4.85	1.59	.32	.14	.11	.14	.31	.45	.62	–.03	.06	.56	
12. Performance	5.22	1.13	.20	.21	.18	.25	.26	.41	.34	.17	.20	.37	.34

*For $r \geq .17$ (two-tailed test) or .14 (one-tailed test), $p \leq .05$;
$r \geq .22$ (two-tailed test) or .19 (one-tailed test), $p \leq .01$.

Analysis

The individual employee was the unit of analysis in this research. Correlational analyses were performed to assess the relationship between the job characteristics and the measures of satisfaction and performance, and to assess the stated hypotheses relating the structure relationships to the job characteristics. Each measure of job characteristics, satisfaction, and performance was regressed on the combined set of structural relationships. Hierarchical regression analyses were then performed to determine whether the structural relationships were related to the satisfaction and performance measures, independently of any relationship they might have had with the job characteristics, or whether the job characteristics mediated the relationship between structure and individual responses.

RESULTS

Relationship of Job Characteristics to Satisfaction and Performance

Means, standard deviations, and intercorrelations for the averaged measures of job characteristics, satisfaction, and performance are presented in Table 2. For the most part, these results replicate previous findings. The job characteristics are moderately intercorrelated, with the exception of the task-support measure. Except for feedback from co-workers and feedback from others, all the job characteristics related positively and significantly ($p \leq .05$) to the measures of satisfaction and performance. The task-support variable, which had not been previously tested, relates strongly to both satisfaction and performance.

Structural Relationships

Results of the correlational analyses between the structural relationships and the measures of job characteristics, satisfaction, and performance are presented in Table 3. Each of the variables of interest was regressed on the five structural relationships, and the squared multiple correlations are shown in the last column of Table 3. The combined set of structural relationships relates significantly to all the variables except for feedback from co-workers and performance.

It was hypothesized that centrality would relate positively to autonomy, skill variety, task significance, and feedback from agents. Of the three measures of centrality (subunit, department, and organization), only subunit centrality tends to support these hypotheses. Subunit centrality is positively and significantly related to autonomy, skill variety, and task significance.

Given the hypotheses, the results in Table 3 regarding organization centrality are surprising. Organization centrality relates strongly and negatively to all the job characteristics with the exceptions of task support and feedback from co-workers. Although the correlations between organization centrality and eight of the nine job characteristics are negative, the relationships between organization centrality and the satisfaction and performance measures are not significant.

Some overall trends concerning the centrality results are worth noting. As the focus of analysis of centrality changes from

Table 3

Zero-Order Correlations of Structural Relationships with Job Measures (N=140)

	Structural Relationships					
	Centrality					
Job Measures	Subunit	Department	Organization	Criticality	Transaction alternatives	R^2
Job Characteristics						
Autonomy	.38••	.07	–.35••	.66••	–.01	.48••
Task identity	.12	–.11	–.23••	.31••	–.10	.12••
Skill variety	.20••	–.27••	–.36••	.43••	–.07	.28••
Task significance	.18•	.10	–.28••	.37••	–.04	.18••
Task feedback	.18•	.11	–.28••	.39••	.06	.19••
Task support	–.16•	.04	.07	.17•	.24••	.14••
Feedback from supervisors	.04	–.06	–.14•	.35••	.07	.14••
Feedback from co-workers	.05	–.09	–.11	.24••	–.04	.07
Feedback from others	.13	–.03	–.49••	.44••	–.16•	.28••
Satisfaction						
General satisfaction	–.06	.09	.09	.17•	.27••	.13••
Supervisor satisfaction	–.01	.10	–.03	.33••	.18•	.16••
Performance	–.08	–.02	–.04	.09	.11	.03

•$p \leq .05$, ••$p \leq .01$

subunit to department to organization, the correlations with the job characteristics, excluding task support, change from positive to negative. Given the significant negative correlation between subunit centrality and organization centrality reported in Table 1 ($r=-.29, p \leq .01$), the results in Table 3 emphasize the importance of distinguishing among different units of reference regarding centrality.

It was hypothesized that criticality would relate positively to autonomy, task significance, task support, and feedback from agents. The results presented in Table 3 support these hypotheses; note the particularly high correlation between criticality and autonomy. The results also indicate that criticality relates positively and significantly to all the variables excepting performance.

The results in Table 3 are as predicted for transaction alternatives. This structural relationship relates positively and significantly to task support and to satisfaction.

Job Characteristics as Mediators

Overall, the results presented in Tables 2 and 3 provide preliminary support for the general hypothesis that the job characteristics mediate the relationship between structure and individual responses. In order to test this hypothesis, a hierarchical regression analysis was performed. The set of all job characteristics was entered into the hierarchical regression equation first. The five structural relationships, as a set, were entered second. Results of this analysis are presented in Table 4.

The failure of the structural relationships to increase significantly the amount of variance explained in the dependent variables beyond that accounted for by the job characteristics suggests that the job characteristics mediate the relationship between structure and individual responses. That is, with job characteristics controlled, the structural relationships as a set do not show any significant independent relationship to the dependent variables. Alternatively, when the structural relationships are entered into a hierarchical regression equation first, followed by job characteristics, the job characteristics significantly ($p \leq .01$) increase the amount of variance explained in the dependent variables.

Similar hierarchical regression analyses were performed using each of the structural relationships separately. For each of the dependent variables, the job characteristics were entered into the equation first, and a particular structural relationship was entered second. With one exception (transaction alternatives and general satisfaction), none of the structural relationships accounted for a significant amount of unique variance in the dependent variables. The amount of unique variance in general satisfaction accounted for by the addition of transaction alternatives was significant ($F_{(1,129)}=4.84, p \leq .05$). However, the partial correlation between transaction alternatives and general satisfaction ($r=.19, p \leq .05$), controlling for the job characteristics, is substantially less than the zero-order correlation between the two variables ($r=.27, p \leq .01$). This difference suggests that although these variables are significantly related independently of all other variables, job characteristics may nevertheless be mediating the relationship in part.

Table 4

Results of Hierarchical Regression Analysis for Structural Relationships, Job Characteristics, and Dependent Variables ($N=140$)

Dependent variables	R^2 Structural relationships	R^2 Job characteristics	Net contribution of structural relationships*
General satisfaction	.132••	.437••	.040
Supervisor satisfaction	.162••	.573••	.011
Performance	.029	.246••	.025

••$p \leq .01$

*This was computed by subtracting R^2 for job characteristics from R^2 for the equation including both job characteristics and structural relationships.

DISCUSSION

Job Characteristics as Mediators

The results of this study support the general proposition that job characteristics mediate the relationship between organizational structure and individual responses. The results show that the structural relationships investigated relate significantly to the job characteristics, which in turn relate significantly to employee satisfaction and performance. Viewed in connection with previous research (Rousseau, 1977, 1978a, 1978b; Sutton and Rousseau, 1979), these findings support the idea that job characteristics are important links between the organizational context and individual responses.

Expanding the Framework

Although no attempt has been made to assess the causes or sources of the workflow arrangements and consequent structural relationships, it is possible that technology, conceptualized as uncertainty, may be having an effect in this area. This possibility is supported by Van de Ven, Delbecq, and Koenig (1976), who found a significant relationship between task uncertainty and four different workflow arrangements. It is also consistent with Rousseau's (1977) findings that different technologies, conceptualized to include both predictability of cause-effect relationships and workflow interdependencies, were associated with different levels of job characteristics. Thompson (1967) also suggested a link between uncertainty and position in the workflow. According to Thompson, jobs and units located early in the workflow process, on the organization's boundaries, act as buffers; the outer units remove uncertainty from work before the work reaches jobs within the organization's technical core. The above articles suggest that the relationship between technology, conceptualized along an uncertainty continuum (Perrow, 1967; Slocum and Sims, 1980), and structural relationships might be fruitfully investigated. Including technology would expand the framework used in the present paper (i.e., technological uncertainty — structural relationships — job characteristics — individual responses), whereas the addition of the structural relationships might provide a link between technology and job characteristics.

Explaining the Structure-Job Characteristics Link

If job characteristics are an important link between organizational context and individual responses, explanations as to how structure relates to job characteristics are essential for a complete understanding of individual responses. The hypotheses generated in this study attempt to explain this link. In this study, however, several unexpected, significant relationships were found. An attempt to explain these results follows.

Criticality. It was predicted that criticality would relate positively to autonomy, task significance, task support, and feedback from agents, but the significant, positive relationships between criticality and task identity and task feedback remain to be explained. Perhaps, as suggested above, technological uncertainty can account for these unexpected results.

It is possible that the conversion of inputs to outputs may be highly uncertain for a high criticality position and may approximate an art more than a set of standardized procedures. Such uncertainty might make it difficult for the organization to fractionate or break down the task into its component parts (thereby reducing task identity). High conversion uncertainty may also prevent standardization of conversion procedures which could, in turn, make it difficult for the organization to hire and train a large number of workers to perform the task. This uncertainty would have the same effect as making the task position a highly critical one, in that a large number of workers and their associated positions would not be available as alternative workflow routes. Furthermore, when the conversion process is highly uncertain (perhaps approximating a trial-and-error process), much of the performance feedback may come directly from actually performing, or attempting to perform, the conversion process.

Transaction alternatives. The relationship between transaction alternatives and task support was positive as predicted. The significant, independent relationship between transaction alternatives and general satisfaction may be the result of decreased dependence on any one source of required inputs or destination of outputs. As previously suggested, decreased dependence may be a source of increased power or influence within the organization. The possibility that structural arrangements of the workflow result in the establishment of power relationships is suggested as a subject for further research.

The small but significant negative correlation between transaction alternatives and feedback from others (such as customers and clients) was unexpected and remains to be explained. An analysis of the workflow diagrams indicates that positions with a high number of transaction alternatives had few input-output links with persons or positions that were not members of the organization. That is, workers with a high number of transaction alternatives tended not to span organizational boundaries (Aldrich and Herker, 1977). It is not surprising then that these workers would not receive feedback from customers and clients, who, by definition, would be considered non-members of the organization.

The conclusion that might be drawn is that more alternative routes exist for the workflow once the work progresses through the external boundary positions and reaches internal positions. This conclusion is supported both by an analysis of the workflow diagrams and by the strong negative correlation between organization centrality and criticality. The more central a position is to the organization, the less critical it is, which indicates that a relatively large number of workers who occupy organizationally central positions engage in the same input-output transactions. This is not to suggest that organizationally central position holders have many transaction alternatives, which is not the case (as indicated by a correlation of .03 between organization centrality and transaction alternatives). Rather, organizationally central, low-criticality positions act as transaction alternatives for the other positions that supply them with inputs and accept their outputs.

Centrality. The unexpected results concerning the three centrality measures may in part be explained by Thompson's (1967) notion that uncertainty is removed as the work proceeds sequentially through the organization. By the time the work reaches the organization's core, much of the uncertainty has been removed and jobs are characterized as highly standardized.

An examination of the workflow diagrams indicates that positions scoring high on organization centrality were located at the core or geographic center of the organization. It is possible, by virtue of a great number of transaction links, for a position to be high on organization centrality but not be located at the internal core of the organization, but the workflow diagrams indicated few examples of this combination. The organizationally central positions tended not to be highly interconnected within their own subunits, but to have transaction links with positions in other subunits.

On the other hand, positions that scored high on subunit centrality tended to be located close to the organizational boundaries. These positions tended to be highly interconnected within their own subunits (as the score on subunit centrality would suggest) but also tended to have transaction links with persons outside the organization.

The average location of departmentally central positions was geographically neither extremely close to the organizational boundaries nor extremely close to the organization's core. Department centrality tended to fall between subunit centrality and organization centrality. Departmentally central positions showed some correlation with organizationally central positions ($r=.27, p \leq .01$), but also had some transaction interdependencies that crossed organizational boundaries.

Following Thompson's (1967) approach, it appears that workers who score high on subunit centrality face more uncertain inputs than do workers who score high on department centrality. In turn, departmentally central positions tend to face more uncertainty than do organizationally central positions. If one assumes an association between uncertainty and standardization, it is not surprising, then, that the relationships between the centrality measures and the Hackman-Oldham (1975) dimensions change from positive (subunit centrality) to negative (organization centrality). The magnitudes of the correlations between department centrality and job characteristics are between those associated with job characteristics and subunit centrality and organizational centrality.

The high degree of standardization expected for organizationally central positions is reflected in the strong negative correlations between organization centrality and autonomy, identity, variety, significance, and feedback. The negative correlation between criticality and organization centrality ($r=-.44, p \leq .01$) is also consistent with the suggestion above that critical positions are difficult to standardize.

The strong negative correlation between organization centrality and feedback from others ($r=-.40, p \leq .01$) might be easily explained by the buffered, internal location of organizationally central positions. Because workers in these internal positions have little contact with customers or clients, they have little opportunity to receive feedback from them. The small but significant negative correlation between organization centrality and feedback from supervisors is consistent with the above explanations; more highly standardized, organizationally central tasks may require less supervision and less supervisory feedback. Supervisory time and feedback may more often be spent on highly critical jobs, as suggested above.

Social Network Analysis

The results presented here support the conceptualization of organizational structure from a relational, network perspective (Lincoln and Miller, 1979; Tichy, 1981; Moch, 1980; Moch, Feather, and Fitzgibbons, 1981). The network and the structural relationship measures provide a method of addressing structure and its impact on individual workers that does not require a large aggregation of individuals, all assumed to be homogeneous for a particular trait. Also, the independent observation and measurement of a network, and the convergence of this measure with measures obtained from respondent listings, provide some indirect support for the measurement methods (questionnaires) used in previous studies of communication networks.

The possibility of applying the measures of criticality and transaction alternatives to communication networks, and/or the simultaneous investigation of different kinds of networks, raises some interesting possibilities for future research. For example, is criticality in the workflow related to centrality in the communication network? Can criticality in the workflow network influence one's position in a power network? Does occupying a peripheral, isolated position in the workflow influence one's chances of being central in a friendship network? Or does having a large number of transaction alternatives result from having a central position in a friendship or communication network?

Job Design

With respect to the design of individual jobs, the results presented here indicate that the one person-one task perspective is too narrow. The way in which task positions relate to one another is shown here to relate significantly to the very job characteristics that this approach addresses. The results of this study also have implications for the redesign of jobs. The results suggest that an employee's position in the workflow should be considered, and the redesign of the workflow, as well as the job, may be necessary to bring about the desired results.

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Problems with Contingency Theory: Testing Assumptions Hidden within the Language of Contingency "Theory"

Claudia Bird Schoonhoven

This paper suggests that there are five problems with contingency theory, ranging from a simple lack of clarity in its theoretical statements to more subtle issues such as the embedding of symmetrical and nonmonotonic assumptions in the theoretical arguments. Starting from Galbraith's (1973) contingency theory about organizing for effectiveness, several traditional contingency hypotheses were tested along with more precise hypotheses developed from knowledge of the five problems with contingency theory. Data were drawn from a study of organizational effectiveness in acute care hospital operating room suites. Although traditional contingency notions were not supported by the data, the more precise hypotheses received stronger empirical support. The study data suggest that relationships between technology, structure, and organizational effectiveness are more complicated than contingency theory now assumes. The paper concludes by suggesting formulation of a contingency theory of organizational effectiveness that includes interactive, nonmonotonic, and symmetrical arguments.[•]

This paper describes five problems with contingency theory that appear to account for much of its mixed empirical support. The problems range from a simple lack of clarity in theoretical statements to more subtle issues, such as the embedding of symmetrical and nonmonotonic properties in theoretical assertions. Once these problems are made explicit, it is possible to make more precise hypotheses about the empirical relationships expected when a contingency process is believed to be operating. The five problems are illustrated by testing hypotheses taken from Galbraith's (1973) contingency theory about organizing for effectiveness under conditions of task uncertainty. The three dimensions of structure focused on are rules and procedures, decentralization of decision making, and professionalization of the work force. Data were drawn from a study of effectiveness in acute care hospital operating suites.

The analytic technique used in this study has not been widely applied to contingency arguments in the past.[1] Previous analyses of contingency ideas have ranged from rich empirical descriptions (Burns and Stalker, 1961) to diagrams and data but no tests of significance (Woodward, 1965; Mohr, 1971), advancing to analysis of variance (Pennings, 1975) and correlational and regression techniques (Khandwalla, 1974). In this analysis, we graphed a partial derivative from the complete regression equation for effectiveness, examining the functional form of the interaction between technology and structure and not just the coefficients of the variables involved. Graphed are the direct effects of structure on effectiveness as well as the interaction with technological uncertainty.

BACKGROUND

Meyer et al. (1978: 18) has recently asserted that contingency theory is widely accepted and, thus, is no longer controversial. His observation is supported by the central position that contingency theory seems to hold in the managerial and applied literature, if judged only by the number of textbooks in the area (e.g., Kast and Rosenzweig, 1974; Tosi and Carroll, 1976;

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[1] I am indebted to Michael T. Hannan for suggesting this technique. Also see Donald E. Comstock's (1975b) unpublished work for an additional illustration of this technique, applied to empirical data.

Galbraith, 1977; Hellriegel and Slocum, 1978). We believe that both Meyer and the textbook authors may have overlooked some important discrepancies between contingency theory and the extent of empirical support for it. In the fourteen years since Thompson's (1967) exhortation that we attend to constraints and contingencies residing within and outside the boundaries of the organization, some have suggested that contingency theory is not a very useful approach to explaining differences in the structure and effectiveness of organizations. Mohr (1971), for example, was among the first to suggest that there were problems with the contingency ideas. In testing the consonance version of contingency theory, he found no support for the hypothesis that work groups will be most effective when autocratic supervision is employed in routine jobs and democratic supervision in nonroutine jobs. In a study of brokerage offices, Pennings (1975) questioned the usefulness of what he termed the "structural contingency model." He did not find strong support for the argument that organizational effectiveness is a function of the goodness of fit or consistency between environmental and structural variables. Both studies have been criticized for other reasons; for example, Pennings's findings could possibly be attributable to lack of environmental variation, since all offices were part of a single brokerage firm (see also Scott [1977: 93] and Lynch [1974: 340]). However, a larger set of problems flows through most discussions by contingency theorists and researchers, which is also reflected in whole or in part in the work of Mohr and Pennings.

PROBLEMS WITH CONTINGENCY THEORY

Lack of Clarity

There are several interrelated problems with contingency theory. First, contingency theory is not a theory at all, in the conventional sense of theory as a well-developed set of interrelated propositions. It is more an orienting strategy or metatheory, suggesting ways in which a phenomenon ought to be conceptualized or an approach to the phenomenon ought to be explained. Drawn primarily from large-scale empirical studies, contingency theory relies on a few assumptions that have been explicitly stated, and these guide contingency research. The first explicit assumption is that there is no one best way to organize; the second is that any way of organizing is not equally effective under all conditions (Galbraith, 1973: 2). The "theory" then asserts that, in order to be most effective, organizational structures should be appropriate to the work performed and/or to the environmental conditions facing the organization. Although the overall strategy is reasonably clear, the substance of the theory is not clear.

The lack of clarity is substantially due to the ambiguous character of the "theoretical" statements. Statements from contingency theorists and researchers suggest that a particular structure should be "appropriate for" a given environment (Thompson, 1967), that organizations are more successful when their structures "conform" to their technologies (Woodward, 1965: 69–71), that an organization's internal states and processes should be "consistent with" external demands (Lawrence and Lorsch, 1969), that organizations should attempt to maximize "congruence" between technology and their structure and adapt their structures to "fit" their technology (Perrow, 1970: 80), that technology and structure need to be properly "aligned" (Khandwalla, 1974: 97), that a "coalignment" should exist between environment and structure (Lawrence, 1975), and that communication structures should "match" the nature of the task (Tushman, 1978). Contingency theory currently requires greater precision than is provided by these richly suggestive but ambiguous statements.

Furthermore, the above statements do not differentiate environment from technology, since neither separate processes nor separate predictions distinguish the two. It is quite possible that environment and technology are related to distinctly different structural variables rather than to the same unspecified set, as is implicitly assumed by the ambiguous "theory."

Contingency Relations as Interactions

The second problem with contingency theory is that lack of clarity by contingency theorists blurs the fact that an empirical interaction is being predicted. When contingency theorists assert that there is a relationship between two variables (dimensions of technology and structure, for example) which predicts a third variable (organizational effectiveness), they are stating that an interaction exists between the first two variables (Namboodiri, Carter, and Blalock, 1975: 109). This point has been made by others; Lazarsfeld (1958) used the phrase "contingent" to describe interactive relationships, and, more recently, Southwood (1978) introduced the term "multiplar" for propositions that predict statistical interaction. The status inconsistency literature demonstrates another theoretical application of the general point. However, this observation has not been explicitly applied to the body of knowledge known to organizational theorists as "contingency theory." For example, in describing the relationship between uncertainty and professionalization, Galbraith (1973: 12–13) implicitly assumed an interaction between the two, since the impact of professionalization on effectiveness is described as varying over the range of uncertainty, but this interactive relationship is not acknowledged. Explicit recognition should be given to the fact that contingency arguments produce interactive propositions.

Functional Forms of Interaction

The third problem is that, because of a lack of clarity, theoretical statements also fail to provide any clues about the specific form of the interaction intended. The mathematical function of the implied interaction between structure and technology (or environment) is seldom made explicit. One consequence of this lack of specificity is that the mathematical function implied by the verbal theory may be represented in practice by a function that has quite different properties. The function implied by the verbal theory is actually a statement about how structure is hypothesized to relate to technology (or environment) for greater effectiveness.

The phrases quoted earlier, such as that structure should be properly "aligned with" technology, "consonant with" technology, "fit," and "be appropriate for" the technological circumstances, can be interpreted several ways. In one theoretical interpretation, one assumes that effectiveness is most likely when two factors such as technological uncertainty and professionalization are both present but that effectiveness is less likely when either is absent. A theory interpreted thus would be multiplicative (Blalock, 1965). It would be expressed by a corresponding function, such as $Y=(X_1X_2)$, and would be stated hypothetically as follows:

> The greater the value of variable 1 (technological uncertainty), the greater the impact of variable 2 (structure) on variable 3 (effectiveness).

A second theoretical interpretation implies that there is a value of structure for each value of technology that will maximize effectiveness. This might be labelled a "matching" or "maximizing" theory, since it presumes that for every X_1 there is a unique X_2 at which Y is maximized and that deviations in either direction from the unique X_2 reduce the value of Y. Functions meeting "matching" theory requirements would be stated as

$$Y=\frac{(\quad 1\quad)}{|X_1-X_2|}.$$ [2]

Its corresponding hypothesis takes the following form:

> Given the value of variable 1 (technological uncertainty), there is a matched value for variable 2 (structure) that produces the highest value of variable 3 (effectiveness). Deviations from this relationship in either direction reduce the value of variable 3 (effectiveness).

Depending on one's interpretation of the theorists' ideas, contingency theory is capable of producing precise hypotheses as well as corresponding functions, as these two examples illustrate.

Other substantive interpretations and their corresponding functional interpretations might be made within the maximizing interpretation. Might not there be several maxima, as in a harmonic function? A harmonic function would be especially consistent with the "consonance" terminology and would represent yet another of the matching and maximizing arguments. Or there could be an asymptotic approach to the maximum. Or perhaps even a threshold effect in which, for a given value of X_2 (technology), the effects of X_1 (structure) on Y (effectiveness) increase as X_1 increases up to a point beyond which no increases in Y occur.

Neither the multiplicative, the matching, nor the maximizing variations developed here exhaust the possible interpretations that can be made of the statements currently used by contingency theorists. However, these rather different interpretations should serve as a sufficient illustration of the difficulties encountered when imprecise statements are used to express theoretical ideas.

This third problem has important consequences. The mathematical function used to express an interaction is not a trivial operational decision. It is one that should be grounded in theory, since its form makes assumptions with clear theoretical implications. If this function is reduced to a relatively thoughtless operationalization, then the theory tested may have quite different properties from the one asserted.[3]

The Analytic Model Used

A fourth problem with contingency theory is that the operational and computational procedures that researchers tend to use impose assumptions on an already imprecise conceptual framework. Because of the tendency to rely on the general linear model and correlational procedures, the relationships studied within the contingency framework are typically assumed to be linear. See, for example, Khandwalla's (1974) correlational and regression analysis of the relationship between mass output orientation and structure, Tushman's (1978) linear analysis of differences in mean amount of communication by task complexity, and Leifer and Huber's (1977) linear analysis of structure and perceived environmental uncertainty. Khandwalla attempts to correct for the limitations of his initial correlational analysis of technology and structure by dichotomizing his sample on relative profitability — a fairly common approach. However, among those using this approach, no explicit attempt is made to test for statistical interaction.

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[2] The term $Y=\frac{(\quad 1\quad)}{|X_1-X_2|}$ is not defined when a subunit is perfectly matched, since the absolute difference between X_1 and $X_2=0$. One approach to this is to set such cases to some non-zero minimum value, close to the value obtained in the data for the "nearly" perfectly matched case. This procedure would insure that the empirical range is not dramatically violated and, thus, that results will not be skewed by an unrealistically high number, once the absolute difference has been divided into 1. I thank an anonymous reviewer for the initial observation and Ruth Cronkite for this approach.

[3] Pennings (1975) is one of the few researchers in the contingency tradition to check for interaction explicitly. However, the value of this contribution is diluted, since the functional forms are not made explicit, nor are precise hypotheses stated.

Some relationships between technology, structure, environment, and effectiveness may indeed be linear. Woodward's (1965) early work, however, should have alerted us at least to check for nonlinear effects, if not to predict or expect them. She found a curvilinear relation between technical complexity and the span of control of first-line supervisors, the proportion of skilled workers, and the number of line and staff specialists.[4]

The sometimes misplaced assumption of linearity is important for two reasons. First and obviously, the researcher fails to check for nonlinear relations when linearity is unquestioningly assumed. Equally as important is that the assumption of linearity masks another implicit assumption hidden within contingency theory, that contingency relations are symmetrical.

Assumptions about Contingency Relationships

An assumption of symmetrical effects is hidden in the language of contingency theory. Often contingency arguments suggest that lower values of a dimension of structure, when coupled with lower values of technological (or environmental) uncertainty, should produce effective organizations. An implication of this argument is that if, instead, high values of structure are combined with low values of technology or vice versa, then effectiveness will be impaired because no congruence exists between technology and structure. This symmetrical property of contingency theory arguments is important because it suggests a nonmonotonic effect of structure on effectiveness over the range of uncertainty, rather than the usual assumption that an effect is constant over all values of the independent variable.

For example, in Galbraith's (1973) argument, combinations of a low value of uncertainty and a low value of structure cannot be distinguished from high-high combinations, since both combinations of values should yield equally effective organizations. It is possible, however, to recast the low-low combination equals effectiveness into a combination that is inappropriate according to the theory, and this would be expected to produce less effective outcomes. For example, lower uncertainty combined with increased decentralization should yield negative outcomes. Were we to recast the combination in such a manner, we could then make more specific hypotheses about the relationships between uncertainty, decentralization, and effectiveness. Three hypotheses become immediately apparent: (1) The impact of decentralization on effectiveness is nonmonotonic over the range of uncertainty. (2) In lower uncertainty subunits, increases in decentralization will negatively influence effectiveness. (3) In higher uncertainty subunits, increases in decentralization will positively influence effectiveness. If we press the implied symmetry assumption, then one clearly must develop a set of nonmonotonic hypotheses, as illustrated above.

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[4] In developing several statistical interaction models, Southwood also discussed curvilinearity, pointing out that it is analogous to interaction and may be confounded with it (1978: 1156).

GALBRAITH'S CONTINGENCY ARGUMENTS

Although this paper has criticized contingency theorists for insufficient clarity, several of Galbraith's (1973) arguments have been selected to test, since his work has several strengths not shared by the others. He has brought a cohesive analytic framework to the structural design of organizations, and he has been quite clear in specifying to what the structure of the organization is adapting. He argued that structure depends on the amount of information processed among decision makers during task execution and, secondarily, on the relative costs of various structural designs.

One of Galbraith's basic assumptions (1973: 4) is that the greater the uncertainty of the task, the greater the information that must be processed during task execution to achieve a given level of performance. He also assumed, however, that alternative structural arrangements vary in their capacities for processing information. Some are more effective than others for a given level of uncertainty. As a consequence, the specific structures adopted should depend on the amount of uncertainty present in the tasks and workflow. Thus, the degree of task uncertainty is the contingent variable on which turn alternative organizational and subunit structures (1973: 4). Galbraith's arguments apply to the organizational as well as to the subunit level of analysis. The author states: "All lead to the conclusion that the best way to organize is contingent upon the uncertainty and diversity of the basic task being performed by the organizational unit. . . . This approach would account for task predictability differences which exist between and within organizations." And this ". . . confirms again . . . that the predictability of the task is a basic conditioning variable in the choice of organizational forms" (1973: 4). When speaking of task uncertainty, Galbraith was actually referring to the research tradition that takes the more general label of research on technology. Environmental uncertainty is a variable independent of technological uncertainty and is explicitly excluded from the arguments considered here and the measures described later.

Given his assumptions, Galbraith developed an information-processing model to explain how uncertainty and information relate to structure (1973: 8). The information processing model incorporates several conventional dimensions of structure: (1) rules and programs, also referred to as standardization; (2) hierarchical referral, or centralization of decision making; and (3) professionalization, an element of goal setting. The model then moves to what Galbraith calls "new design strategies" (1973: 15) as more uncertain tasks are faced: (4) creation of slack resources, (5) creation of self-contained tasks, (6) creation of vertical information systems, and (7) creation of lateral relations (1973: 15). The focus here is on the first three arguments in his model, since the largest body of research is on these traditional dimensions of structure; the purpose is only to illustrate the problems with contingency theory, not to test Galbraith's entire model comprehensively.

Implied Multiplicative Hypotheses

Since Galbraith prefers not to formalize relationships as hypotheses or as mathematical functions (1973: viii), the reader must discover the precise relations that he intends to hold between uncertainty and each of the dimensions of structure. We assume that the "true" relationship that Galbraith intends between uncertainty and each dimension of subunit structure is a multiplicative one. When a relationship between two variables is expressed as a multiplicative function, the effect of one variable, X_1, is increased by higher values of the other, X_2 (Namboodiri, Carter, and Blalock, 1975: 175) and produces the most pronounced impact on the dependent variable when both exhibit high values. This effect is consistent with Galbraith's emphasis on the higher ranges of task uncertainty and structure in his discussions. The following statement is an example of the general form of the contingency hypotheses suggested in Galbraith's works, assuming a multiplicative relationship between uncertainty and structure: the greater the task uncertainty, the greater the impact of a dimension of structure on effectiveness. This paper focuses on three of his specific arguments, first presenting Galbraith's contingency hypothesis and then an elaborated set of contingency hypotheses developed with awareness of the five problems with contingency theory described earlier.

Hypothesis 1: Uncertainty, Rules and Programs, and Effectiveness

Galbraith linked uncertainty, rules and programs, and effectiveness in the following way: when task uncertainty is low and work is very predictable, information-processing needs are low. Since organizations seek to increase the predictability of their production tasks through program specification (March and Simon, 1958), task-related rules and procedures will be established to guide execution. "Many standard operating procedures arise in this manner" (Galbraith, 1973: 10). As task uncertainty increases, however, one cannot accurately predict a priori the combinations of possible events and the proper "rules" to apply. To attempt to do so is likely to cause the inflexible application of rules to cases in which standardized procedures are inappropriate and, thus, less effective. Therefore, the general rule becomes, "Decide what to do when you encounter the contingency," and there should be less standardization of rules and procedures as uncertainty increases (Galbraith, 1973: 10–11). "Destandardization" can be substituted for "less standardization" to simplify the wording. The first hypothesis advanced from Galbraith's discussion is as follows:

Hypothesis 1 (H_1): The greater the technological uncertainty, the greater the positive impact of destandardization on effectiveness.

Hypothesis 2: Uncertainty, Decentralization of Decision Making, and Effectiveness

Galbraith asserted that centralization of decision making should vary with task uncertainty for greater effectiveness. He argued that when exceptional cases are encountered at lower levels of uncertainty, these are usually referred upward in the managerial hierarchy for centralized decision making. Centralization is possible since information processed does not overburden the hierarchy at lower levels of uncertainty. However, as uncertainty increases, inflating the volume of information required at the point of task execution, increased participation in decision making must be exercised by the workforce. "This can be accomplished by increasing the amount of discretion exercised by employees at lower levels of the organization" (1973: 12). Subunits structured to refer all exceptional cases upward to a centralized decision point are likely to suffer significant delays in implementing decisions because of the lengthy referral process. This may be an efficiency loss for outcomes in some organizations; however, if the unit is performing tasks in which a more rapid decision process is crucial to outcomes, then decision delays have clear implications for outcome quality (Galbraith, 1973: 11–12). Upward referral also results in condensation of information as well as some distortion (March and Simon, 1958); thus, the probability that decisions made far from the site of task execution will be inappropriate is clearly increased. The second hypothesis advanced from Galbraith is as follows:

Hypothesis 2 (H_2): The greater the technological uncertainty, the greater the positive impact of decentralization on effectiveness.

Hypothesis 3: Uncertainty, Professionalization, and Effectiveness

Galbraith argued that, as task uncertainty increases and it becomes more efficient to decentralize decision making down to the points of action at which the information originates, the organization faces a potential behavioral control problem. "That is, how can the organization be sure that the employees will consistently choose the appropriate response to the job-related situations which they will face?" (1973: 12). He answered his question by noting that to increase the probability that employees will select the appropriate behavior, organizations substitute craft or professional training of the workforce for lower levels of training and skill. He referred to this as professionalization (1973: 12), or selection of responsible workers who have the appropriate skills and attitudes. As a consequence, once the skills and training of the workforce have been adapted to task uncertainty needs, then task-relevant decisions can be safely delegated to the level of the workforce itself without sacrificing control over outcome quality (1973: 12–13). The last contingency hypothesis derived from Galbraith is the following:

Hypothesis 3 (H_3): The greater the technological uncertainty, the greater the positive impact of professionalization on effectiveness.

A Set of Elaborated Contingency Hypotheses

The arguments and hypotheses above assume a positive monotonic effect of structure on effectiveness. Consistent with his preference for not stating hypotheses, Galbraith does not explicitly discuss the question of monotonicity in his arguments. Since nonmonotonic relationships are rare and seldom appear in organizational sociology, and given the absence of specific information to the contrary in his work, monotonic relationships are assumed for Galbraith's arguments. The monotonic assumption is incompatible with the symmetrical property of contingency arguments identified earlier, however. If lower ranges of uncertainty require standardized procedures, for example, then destandardizing should have a negative influence on effectiveness. As a consequence, we should expect a nonmonotonic effect of destandardization on effectiveness over the range of uncertainty. Assuming a multiplicative form of interaction between uncertainty and each dimension of structure, as well as identifying a symmetrical and thus nonmonotonic effect of structure on effectiveness over the range of uncertainty, three hypotheses rather than one may be advanced for each of the original contingency relationships:

Hypothesis 1a (H_{1a}): The impact of destandardization on effectiveness is nonmonotonic over the range of uncertainty.

Hypothesis 1b (H_{1b}): When technological uncertainty is low, increases in destandardization will negatively influence effectiveness.

Hypothesis 1c (H_{1c}): When technological uncertainty is high, increases in destandardization will positively influence effectiveness.

Hypothesis 2a (H_{2a}): The impact of decentralization on effectiveness is nonmonotonic over the range of uncertainty.

Hypothesis 2b (H_{2b}): When technological uncertainty is low, increases in decentralization will negatively influence effectiveness.

Hypothesis 2c (H_{2c}): When technological uncertainty is high, increases in decentralization will positively influence effectiveness.

Hypothesis 3a (H_{3a}): The impact of professionalization on effectiveness is nonmonotonic over the range of uncertainty.

Hypothesis 3b (H_{3b}): When uncertainty is low increases in professionalization will negatively influence effectiveness.

Hypothesis 3c (H_{3c}): When uncertainty is high, increases in professionalization will positively influence effectiveness.

Hypotheses About the Effects of Uncertainty and Resources

To this point it has been argued contingently that several dimensions of structure interacting with technological uncertainty will increase organizational effectiveness. A more exacting approach, however, is to determine the explanatory power of an interaction after controlling for the main effects of variables comprising the interaction term. We can control for the direct effects by adding measures for each of the main variables in the technology and structure interaction. This means that we will look in the analysis for information on both X_1, the effect of destandardization, for example, as well as for information on X_1X_2, the interaction effect of destandardization and uncertainty. The model being developed controls for the effects of structure on effectiveness and also hypothesizes the negative influence of uncertainty on effectiveness. In the latter hypothesis, uncertainty is presumed to undermine organizational effectiveness unless it is met by structural features designed to absorb the information uncertainty. Restated as an hypothesis:

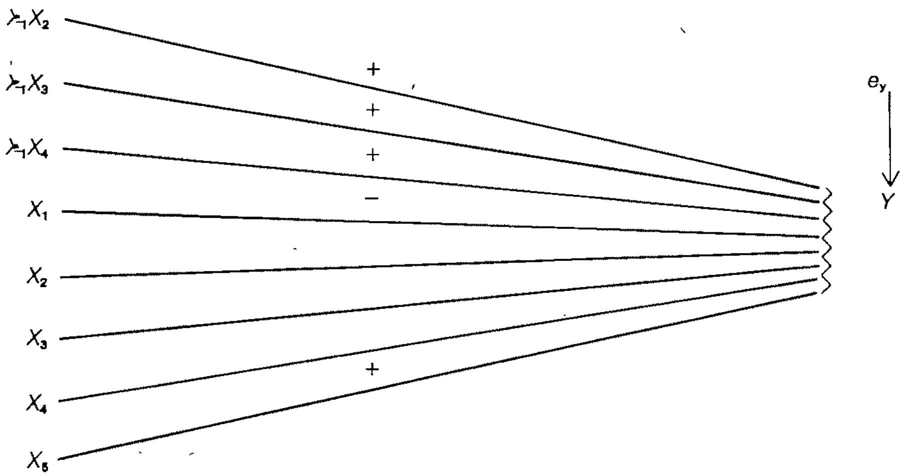
Hypothesis 4 (H_4): Uncertainty will be negatively related to effectiveness.

Galbraith's original hypotheses (H_1 through H_3) are compared with the elaborated set of contingency hypotheses (H_{1a} through H_{3c}) in a model predicting organizational effectiveness. To this model one additional variable, resources of the organization, has been added as a control. This was done because resources have been found to influence effectiveness. In their study of school organization and achievement, Bidwell and

Kasarda (1975: 68) found that ". . . resources did have a substantial impact" on effectiveness. Essentially, greater resources appear to allow for implementation of the relations between uncertainty and structure believed to be necessary for effectiveness or, in Galbraith's terms, to allow for the relative costs of various structural designs. A fifth hypothesis is developed by bringing resources explicitly into the model:

Hypothesis 5 (H_5): The greater the organizational resources, the greater the effectiveness of the organization.

The hypotheses stated above can be described in a causal model. Figure 1 represents the system of relations hypothesized; notations on the paths between variables represent the positive or negative relationships expected.



Where:

X_1 = Workflow uncertainty
X_2 = Destandardization
X_3 = Decentralization
X_4 = Professionalization
X_5 = Resources
Y = Effectiveness

$$Y = a + X_1X_2 + X_1X_3 + X_1X_4 - X_1 + X_2 + X_3 + X_4 + X_5 + e_y \qquad (1)$$

Figure 1. Causal model of organizational effectiveness predicted from three technology-structure interactions.

METHODS

As part of a larger study of the quality of surgical care in hospitals (see Stanford Center for Health Care Research, 1974; Scott, Forrest, and Brown, 1976), data were collected on 8,593 patients who underwent surgery in the operating room suites (ORs) of 17 acute-care hospitals in the U.S. The sample included only nonfederal, voluntary, or community, nonprofit hospitals providing short-term care for a variety of acute medical and surgical patients. The hospitals were selected to maximize variance in size (from 99 to 638 beds), expense ratio (from $28,000 to $56,000 annual expenses per occupied bed), teaching status (six hospitals were affiliated with a medical school or had an approved and active house staff program, whereas the remainder had no active physician training programs), and geographical location (10 states and all major regions of the continental U.S. were represented). Although every effort was made to produce a representative sample of U.S. acute-care hospitals, the sample was biased in favor of larger hospitals (the average number of beds per hospital in the sample was 310, compared to the national average of 153 beds for hospitals of the same type).

This study focused on the surgical transformation process in these hospitals and the patients operated on within that process. Although the technical core of surgery is the operating room suite (OR), the entire surgical transformation process includes the OR suite as well as patient wards regularly caring for at least 12 surgical patients during the year preceding the study.

The patients studied underwent at least one of 15 surgical procedures selected as the basis for indicators of organizational effectiveness: gastric surgery for ulcer; selected surgery of biliary tract; surgery of large bowel; appendectomy; splenectomy; abdominal hysterectomy; vaginal hysterectomy; craniotomy; amputation of lower limb (ankle to hip); fractured hip; arthroplasty of the hip; lumbar laminectomy, with or without fusion; pulmonary resection; prostatectomy; and selected surgery of abdominal aorta and/or iliac arteries. These procedures were selected by several criteria. Since death following surgery is a relatively rare event in today's modern hospitals, we attempted to maximize the number of deaths observed by choosing high-volume procedures or those with a high risk of a poor outcome. We also included surgical procedures by which the disease could be staged as to its severity or progress, procedures on a variety of organ systems, a range of surgical specialties, and procedures affecting both male and female patients in a wide range of ages and physical conditions. These latter data formed one of the major strengths of the larger study and also of our measures of surgical effectiveness. We used them to adjust for patient preoperative condition by including disease stage and the preoperative physical status of the patient. The number of patients studied per OR varied by size of hospital, ranged from 39 to 1,256, and accounted for 81 percent of the 10,563 who qualified for inclusion.

Sources of Data

Five principal sources of data were used in this analysis: (1) an interview with each hospital administrator, (2) interviews with the director of the operating room, (3) questionnaires administered to all registered and practical nurses in the OR suite, (4) a daily schedule of the operations to be performed in each OR, sampled every four days for eight and a half months, and (5) information on the physical status, disease stage, age, sex, economic status, and death or complications following surgery for individual patients.

All questionnaires and interviews administered to members of the hospital staffs were collected by two teams of interviewers, who spent approximately two weeks in each hospital administering the instruments. Copies of the original operating room schedules and modifications of them were collected from the OR suites by a set of part-time technicians located in each hospital for the duration of the study. Technicians also gathered the data on individual patient characteristics, which formed the basis for computing the outcomes of surgery — death and complications — that were the measures of surgical effectiveness. Both the interviewers and the technicians employed detailed schedules and structured instruments in their data collection activities and received extensive training before entering the field.

Measures

Our approach to measuring technology, structure, and effectiveness is presented here, whereas detailed descriptions of the operationalizations of each variable are presented in Appendix A. We measured a single technology, the one directly characteristic of the organizational unit studied, the operating room. Several separate production technologies may be present in the same organization, each with different characteristics. Researchers, however, generally assume that organizations possess only one type of technology, failing to differentiate multiple technologies. This is a fairly crucial distinction, since some researchers have averaged across several technologies in the same organization (Khandwalla, 1974); others have dropped from the analysis organizations with more than one technology (Woodward, 1965); and still others have failed to note the issue at all (Harvey, 1968; Rushing, 1968; Hickson, Pugh, and Pheysey, 1969).

Our indicators of technology measured variation in the workflow of the operating room (OR) and, hence, uncertainty. Daily fluctuations, as well as variations over time in the number and type of operations, greatly affect the flow of work in the OR. Our approach assumed that variation in the flows of patients (by type and expected arrival for specific operations) determines predictability of the care tasks confronting the OR staff.

We measured structure at the same level of analysis as technology, since our measures of destandardization, decentralization, and professionalization all relate to the structure of the operating room itself rather than to the larger organization. In much research in the technology and structure tradition these two variable sets are measured at different levels of analysis. Whether consciously or not, some research designs continue to reflect the expectation that technology at the workflow level of production should be strongly correlated with structural variables at the more remote administrative levels of the organization, despite the findings of Hickson, Pugh, and Pheysey (1969) to the contrary and the theoretical argument of Scott et al. (1972). In general, it is important to make explicit the levels of organization at which we measure both technology and structure, given the mixed empirical results characteristic of research on the relationships between the two variables.

We measured effectiveness as severe morbidity: a risk-adjusted postsurgical death and complication rate averaged for all patients undergoing surgery in the operating room suite of a given hospital. There are several points to be made regarding this measure. The first concerns level of analysis. In our critique of contingency theory, we have been broadly concerned with how environment, technology, and structure influence organizational effectiveness. Once focused on a specific theoretical argument, Galbraith's, our interest has narrowed to the influence of technology and structure on organizational effectiveness. In this latter tradition, arguments have been made at both the subunit and organizational level. Our measurement concern was with organizational and suborganizational level phenomena, given that it is at those levels at which the theoretical arguments about contingency theory are made. We measured effectiveness at the same level of analysis as that at which technology and structure were measured, since post-surgical death and complication rates characterize outcomes of the surgical transformation process. We selected the subunit rather than the larger organizational level, because the higher level (with overall hospital death and complication rates, for example) would include measures from more than a single technology; in acute-care hospitals the two main technologies are medical and surgical care. Thus, the organizational level would be inappropriately high for this study, mixing outcomes not treated in the transformation process.

Another point about the effectiveness measure concerns the adjustments made for the patient's preoperative characteristics. A real strength of the larger study design (Stanford Center for Health Care Research, 1974; Scott, Forrest, and Brown, 1976) as well as of this analysis is that it included six characteristics of patients — sources of input variations to the transformation process — in the measure of effectiveness. Through health care literature it is now well known that postsurgical death and complication rates are related to patients' preoperative and socioeconomic conditions. Noting this point in a different organizational setting, Hannan, Freeman, and Meyer (1976), in a comment on Bidwell and Karsarda's (1975) work, argued that there are two specification errors to be aware of when analyzing models of school effectiveness: omission of input variables and analysis at the wrong level. They pointed out that ordinary least squares applied to a model that excludes causal variables correlated with those included gives biased estimates, confounding organizational effects with the effects of excluded input variables. Given an error of specification (excluding student input variables, in this case), analysis with data aggregated above the theoretically appropriate level can lead to inflation of the original errors of misspecification (Hannan, Freeman, and Meyer, 1976).

Hannan, Freeman, and Meyer noted further that they ". . . would similarly be suspicious of estimates of the effect of hospital organization properties on treatment effectiveness which ignored such input variations as patient risk at time of entry into the hospital" (1976: 137). As the health care literature attests, their concern is well placed. By including characteristics of patients in our measure of effectiveness, the problem of specification bias was avoided. Our measure of effectiveness was adjusted for the six patient-specific variables of stage of surgical disease, physical status, age, sex, life stress, and the likelihood of the patient's seeking medical care. Hannan, Freeman, and Meyer (1976: 137) also noted that they ". . . hold no brief for the priority of individual level propositions" applied to studies and theories of organizational effectiveness. Having dealt in this study with their initial concern by including input variables, we have also dealt with their second concern about the inflation of original errors of misspecification through aggregation.

Measurement details for all variables are described in Appendix A, including the means, standard deviations, and ranges for each measure used in the analysis.

Analysis of Data

Analysis of the data proceeded in two steps. First, the model of organizational effectiveness was tested using multiple regression analysis. The equation used was Equation (1) described in Figure 1. Since two dimensions of professionalization have been identified in the measurement appendix (Appendix A), the equation was run twice. In the first equation, initial training (B.S. degree) was the dimension of professionalization (X_4) employed, whereas in the second equation all measures remained the same but professional activities were substituted as the measure of X_4. Results are presented as unstandardized regression coefficients. Unstandardized regression coefficients were used for a number of reasons, the most salient of which had to do with testing for interaction in multiple regression. Allison (1977) has shown that the inclusion of a product term in a multiple regression is a legitimate way to test for interaction — as we have done, using a multiplicative term. He showed, along with Althauser (1971) before him, that the standardized coefficient for the product term is affected by changes in the means. However, the unstandardized coefficient for the product term is not affected, nor is the T-test for the product term affected by the addition of arbitrary constants to the variables in the model.

To determine if a nonmonotonic effect was present, we pushed the analysis to a second stage: the graphing of a partial derivative from the larger regression equation for effectiveness. Merely inspecting the signs and magnitudes of regression coefficients is insufficient analysis for contingency hypotheses. Graphing a partial derivative from the larger regression equation will reveal nonmonotonic effects not readily apparent in the tabled coefficients. If a nonmonotonic effect is present, as revealed by the graph and its calculations, it will add substantially to our knowledge to know where in the range of technology a change in the direction of a slope occurs. In the second phase of the analysis, a method for plotting the joint effect of the main and interaction terms was introduced, followed by graphs of each interaction term. Each graph expresses the change in effectiveness, given a change in a structural dimension, over the range of uncertainty. In so doing, we tested for the extent to which dimensions of subunit structure have a symmetrical and nonmonotonic effect on effectiveness over the range of uncertainty.[5]

RESULTS

Results of the first phase of the analysis are presented in the Table: unstandardized regression coefficients of severe morbidity on the interactions between technology and structure, their main effects, and the resources of the organization. In interpreting these results, readers should note a peculiar feature of the effectiveness measure: severe morbidity is expressed in positive numbers, which are interpreted negatively. If a particular variable is positively related to severe morbidity, then severe morbidity increases. This is interpreted as an undesirable outcome, since lower rates of severe morbidity are desired for greater surgical effectiveness. As a consequence, variables with an inverse relationship to severe morbidity, in fact, enhance organizational effectiveness.

In this analysis the focus was on variables relevant to Galbraith's and our contingency hypotheses: the interactions

[5] While Hannan, Freeman, and Meyer (1976) originally suggested this technique, Southwood has also commented recently that "it is possible to determine the range of the effect of X_1 over the range . . . of X_2, and vice versa. This is not provided by the regression equation but may be deduced from it by substituting values on the control variable at the extremes of its range" (1978: 1168).

Table

Regression Coefficients of Organizational Effectiveness Measured as Severe Morbidity* ($N=17$ Operating Room Suites)

	Uncy DeStd (X_1X_2)	Uncy DeCnt (X_1X_3)	Uncy Proflzn (X_1X_4)	Uncy (X_1)	DeStand (X_2)	DeCent (X_3)	Proflzn (X_4)	Resour (X_5)	Constant	F	R^2
Equation (1) for severe morbidity	−7.34••• (2.14)	−2.53•• (1.04)	−10.3 (12.6)	+24.[illegible]•• (8.0[illegible])	+2.81••• (.842)	+.827• (.416)	+3.72 (5.04)	−6.14••• (2.43)	−7.31	3.96	.81
Equation (2) for severe morbidity	−7.72••• (2.40)	−2.70• (1.22)	−1.20 (1.44)	+28.[illegible]•• (11.[illegible])	+2.95••• (.939)	+.928• (.497)	+.479 (.583)	−6.78••• (2.11)	−8.92	3.85	.81

•=$p \leq .10$; ••=$p \leq .05$; •••=$p \leq .01$.

Unstandardized Regression Coefficients. Standard errors in parentheses.

*Effectiveness, measured as severe morbidity, is interpreted negatively. The higher the severe morbidity — death or complications following surgery — the lower the effectiveness. If a variable is positively related to severe morbidity, then severe morbidity increases.

between uncertainty and destandardization, decentralization, and professionalization. Comments on findings for resources were expressed elsewhere (Schoonhoven, 1976) and are not repeated here. In the Table, the first three coefficients in both equations express the interaction terms. The uncertainty-destandardization (X_1X_2), the uncertainty-decentralization (X_1X_3), and the uncertainty-professionalization (X_1X_4) interactions have negative effects on severe morbidity. This means that effectiveness is enhanced, since severe morbidity was decreased by each of the three technology-structure interactions. Although the first two coefficients in each equation were significant and all three coefficients in each equation were in the expected direction, these results only partially supported Galbraith's hypotheses 1, 2, and 3 because we could not yet determine if the effects were monotonic or not. Nevertheless, at first glance, of the three contingency hypotheses suggested by Galbraith, the uncertainty-destandardization and the uncertainty-decentralization relationships appeared to be clearly supported in this first phase of the analysis, and the uncertainty-professionalization relationship appeared to be partially supported.

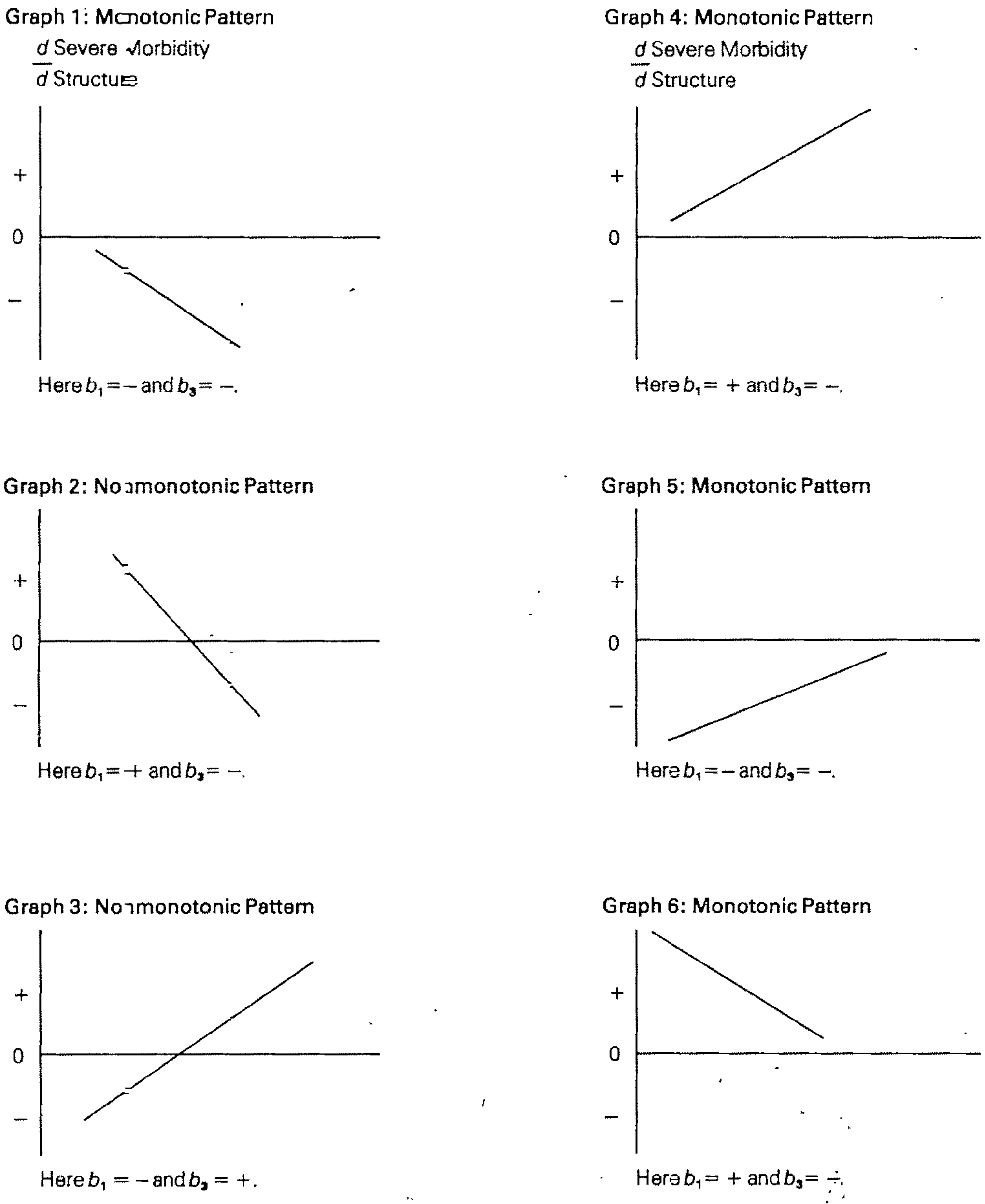
Examining only the algebraic signs of each interaction term, while controlling for the corresponding main effects, as we have done in the Table, gives insufficient information for properly testing a contingency hypothesis. The signs of a coefficient can tell us if an effect is in the hypothesized direction. For example, destandardization in the first equation has a positive coefficient of 2.81 on severe morbidity. In interaction with uncertainty, the effect is a negative 7.34. From these data we would expect to see a decreasingly positive slope expressing the change in severe morbidity, given a change in destandardization over the range of uncertainty. We could not, however, determine whether a symmetrical and nonmonotonic effect was present by inspecting the regression coefficients. We therefore moved to phase two of the analysis, plotting the joint effect of the main and interaction terms.

Analysis of Interaction Terms

Galbraith's arguments suggest that the greater the uncertainty, the greater the positive impact of destandardization, decentralization, and professionalization on effectiveness. These hypotheses were tested by elaborating each interaction term mathematically and then displaying it graphically. In so doing, any symmetrical and nonmonotonic effects would be revealed, directly testing the adequacy of traditional contingency hypotheses like Galbraith's as compared to the ones elaborated. For those unfamiliar with the technique of graphing a partial derivative from the larger regression equation, equations (2) through (6) in Appendix B provide a more detailed explanation of the method.

The six graph patterns possible are illustrated in Figure 2. Graph (1) illustrates the pattern that would be observed if Galbraith's hypotheses were correct, using severe morbidity as the measure of effectiveness. Results like these would indicate that the greater the uncertainty, the greater the negative impact of a dimension of structure on severe morbidity, and therefore, the greater the effectiveness, as hypothesized. Results like these are possible when both b_1 and b_3 take negative values and the

Figure 2. Potential graph patterns.


Graph 1: Monotonic Pattern

Here $b_1 = -$ and $b_3 = -$.

Graph 2: Nonmonotonic Pattern

Here $b_1 = +$ and $b_3 = -$.

Graph 3: Nonmonotonic Pattern

Here $b_1 = -$ and $b_3 = +$.

Graph 4: Monotonic Pattern

Here $b_1 = +$ and $b_3 = -$.

Graph 5: Monotonic Pattern

Here $b_1 = -$ and $b_3 = -$.

Graph 6: Monotonic Pattern

Here $b_1 = +$ and $b_3 = -$.

relationship is monotonic. Graph (2) illustrates the pattern required if the nine elaborated contingency hypotheses ($H_{1a,\ 1b,\ 1c}$ through $H_{3\ ,\ 3b,\ 3c}$) are supported. A nonmonotonic effect is apparent in this graph, since the plotted line crosses the horizontal axis, thereby changing signs, and b_1 would be a positive and b_3 a negative value. Graph (3) illustrates the remaining nonmonotonic effect, whereas graphs (4) through (6) reveal the other monotonic patterns possible.

Interaction of Destandardization and Uncertainty

The Table showed that the uncertainty-destandardization interaction had a significant negative effect on severe morbidity. Since the results were substantively identical in both equations, for simplicity we graphed the interactions using coefficients from the first equation only. To analyze the interaction, we assumed that the effect of increasing destandardization on severe morbidity is modified by the level of uncertainty facing the organizational unit. This interpretation of the interaction may be expressed as Equation (3) (Appendix B):

$$Y=b_1X_1+b_3X_1X_2. \tag{3}$$

This means that the effect of destandardization on severe morbidity is modified by uncertainty. This partial form of the larger regression Equation (1) controls for all other terms in the equation.

First, we had to determine if the effect of destandardization on severe morbidity was monotonic over the range of uncertainty observed in our sample. We used Equation (6) (Appendix B) to find the point at which an increase in destandardization has no effect on severe morbidity:

$$X_2=-b_1/b_3, \tag{6}$$

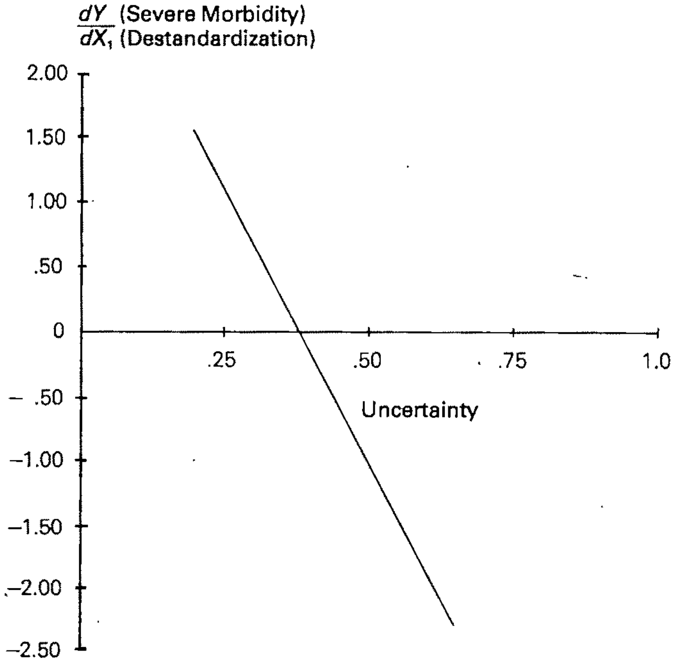
where X_2=uncertainty; b_1=main effect of destandardization; and b_3=uncertainty destandardization. We substituted into the equation regression coefficients from the Table, first equation, finding that

$$X_3=-b_1/b_3=-(2.81)/-7.34=.38.$$

Since the calculated value of uncertainty (X_2) was within the range observed in our sample—.191 to .718 (Appendix A)—we concluded that destandardization has a nonmonotonic effect on severe morbidity over the range of uncertainty.

This nonmonotonic effect indicates that destandardization has a negative effect on some operating room suites and a positive effect on others. The effect depends on the degree of workflow uncertainty. To depict where the positive and negative effects are over the range of uncertainty, we plotted the effect of destandardization on severe morbidity. We substituted into Equation (4) values of uncertainty in order to locate the appropriate plots.

Figure 3 shows the effect of uncertainty on the relationship between destandardization and effectiveness. Its vertical axis represents the effect of destandardization on severe morbidity. The horizontal axis indicates the degree of workflow uncertainty. The plotted line represents the change in severe morbidity, given a change in destandardization over the range of uncertainty. From the plotted line we see that the effect of destandardization on severe morbidity is positive in the uncertainty range below .38 and negative in its higher range above the value



Severe Morbidity = 2.81 (DeStand)−7.34 (DeStand*Uncertainty)

$Y=b_1X_1+b_3b_3$ $dY/dX_1=b_1+b_3X_2$

Figure 3. The effect of technological uncertainty on the relationship between destandardization and effectiveness, measured as severe morbidity.

of .38. That is, destandardization promotes effectiveness in the range of uncertainty above .38, but below that point increases in destandardization decrease effectiveness, since severe morbidity increases where the slope is positive. The plot of the partial derivative from the original regression equation therefore revealed the following symmetrical and nonmonotonic relationships:

In lower uncertainty subunits, destandardization has a positive effect on severe morbidity, thus reducing effectiveness. However, the slope is a decreasingly positive one, so that the disadvantages of destandardization decrease as uncertainty increases.

In greater uncertainty subunits, destandardization has a negative impact on severe morbidity, thus increasing effectiveness. The slope is an increasingly negative one, so that the advantages of destandardization become greater as uncertainty increases.

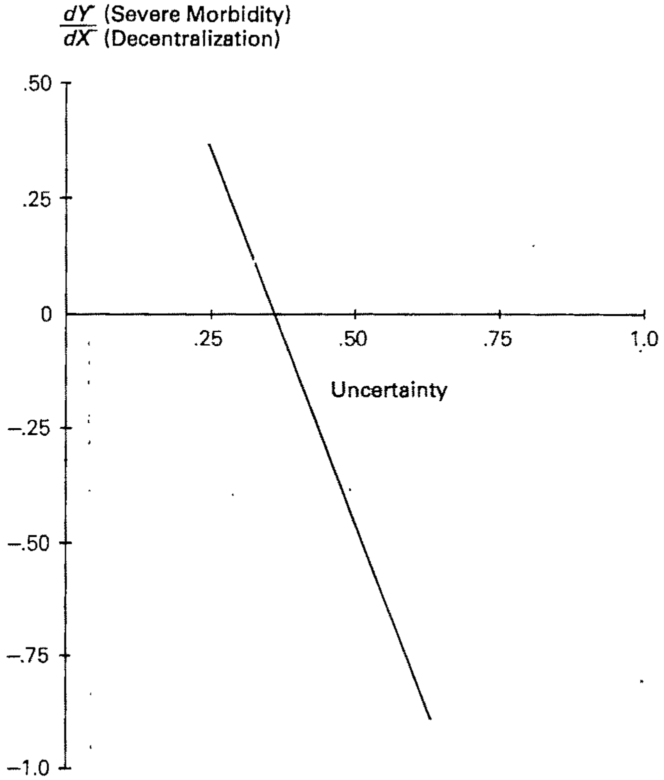
Galbraith's first hypothesis was not supported by this analysis, because a nonmonotonic effect is apparent, and the process is more complicated than his arguments indicate. However, the alternative hypotheses advanced from problems with contingency theory are supported. The impact of destandardization on effectiveness is nonmonotonic over the range of uncertainty, as hypothesized (H_{1a}). The interaction between uncertainty and destandardization, expressed as a multiplicative function, is significant. And there was a symmetrical effect in the data, as expected.

Interaction of Uncertainty and Decentralization

The Table showed that the interaction between uncertainty and decentralization has a significant effect on severe morbidity. To interpret this interaction, we made the assumption that the effect of decentralization on effectiveness is modified by the level of uncertainty present in the organizational unit. The interpretation of this interaction would also be expressed as Equation (3).

To determine if a nonmonotonic effect was present over the range of uncertainty, we again substituted coefficients from the table into Equation (6) (Appendix B). The value of uncertainty at which changes in decentralization had no effect on severe morbidity was .326. Since .326 was within the observed range of uncertainty in our sample (.191 to .718), the effect of decentralization on severe morbidity was nonmonotonic over the range of uncertainty. The point of inflection, where the slope changes signs, was quite near the mean level of uncertainty of the subunits.

Figure 4, the plot of this interaction, reveals the following. In lower uncertainty subunits, decentralization had a positive effect on severe morbidity; that is, it increased severe morbidity, and effectiveness decreased. However, in greater uncertainty subunits, decentralization had a negative effect on severe morbidity, thus decreasing severe morbidity and increasing effectiveness. Because of its decreasing negative slope, effectiveness was even further enhanced as decentralization increased in the highest uncertainty subunits.



Severe Morbidity=.827 (DeCent)−2.53 (DeCent*Uncertainty)

$Y=b_1X_1-b_3X_3$

$dY/dX_1=b_1+b_3X_2$

Figure 4. The effect of technological uncertainty on the relationship between decentralization and effectiveness, measured as severe morbidity.

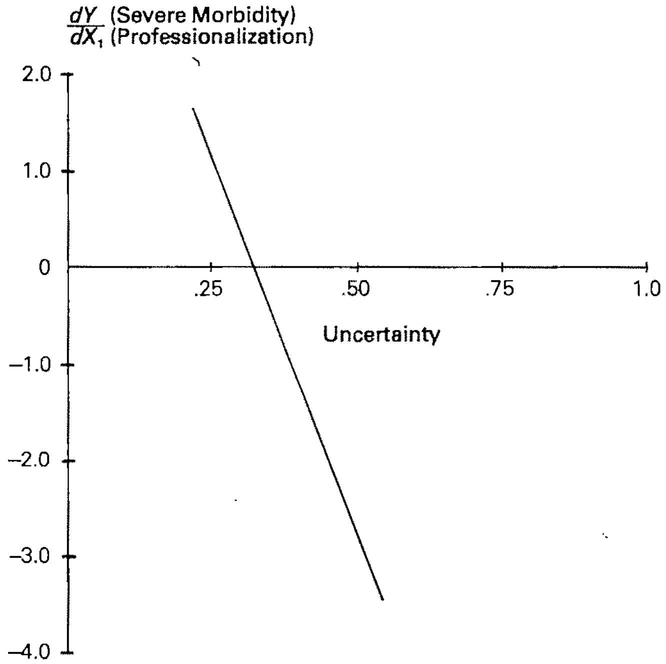
These results parallel our findings for the uncertainty-destandardization interaction. Galbraith's second hypothesis was not supported by these data, because a nonmonotonic effect was apparent, rendering the interaction more complicated than his arguments would suggest. In contrast, the alternative hypotheses advanced from an analysis of problems with contingency theory were supported by the data. The impact of decentralization on effectiveness was nonmonotonic over the range of uncertainty, as hypothesized (H_{2a}), and a symmetrical effect was apparent, as expected.

Interaction of Uncertainty and Professionalization

The coefficient expressing the uncertainty-professionalization interaction was also in the expected direction (Table). To interpret the interaction, we made the assumption that the effect of professionalization on effectiveness is modified by the level of uncertainty present in the subunit. This interpretation is also expressed as Equation (3). To determine if a nonmonotonic effect was present, we once more substituted coefficients from the Table into Equation (6). The value of uncertainty at which changes in professionalization had no effect on severe morbidity was:

$X_2=-b_1/b_3=-3.72/-10.3=.36.$

Since .36 is within the observed range of uncertainty — .191 to .718 — we concluded that the impact of professionalization was nonmonotonic over the range of uncertainty.



Severe Morbidity = 3.72 (Proflzn)−10.3 (Proflzn•Uncertainty)

$Y=b_1X_1+b_3X_3$

$dY/dX_1=b_1+b_3X_2$

Figure 5. The effect of technological uncertainty on the relationship between professionalization and effectiveness, measured as severe morbidity.

Figure 5 graphically displays the nonmonotonic effect. The positive slope of professionalization on severe morbidity decreases until it reaches zero at an uncertainty level of .36. It then turns down and is increasingly negative as uncertainty increases. Thus, in operating room subunits with below the average level of workflow uncertainty, an increase in professionalization of the workforce resulted in greater rates of severe morbidity. Although this effect was predicted from the analysis of problems with contingency theory, in substance it is quite contrary to conventional theorizing about the benefits of professional training. In operating subunits with moderate to high levels of uncertainty, however, increases in professionalization resulted in reduced rates of severe morbidity and thus greater effectiveness. These results were consistent over both dimensions of professionalization: initial training and the extent to which initial training was supplemented and maintained by current professional activities. The findings were duplicated when the coefficient for the second dimension was used to produce the graph. The data wholly support hypotheses 3_a, 3_b, and 3_c. This particular analysis must be interpreted cautiously, however. Although the coefficients for the uncertainty-professionalization interaction were in the expected direction, the results may be unreliable, given the size of the standard errors associated with the original regression coefficients.

Despite the complicated interaction effects that our analysis has revealed, the following possibility presents itself. One might argue that the significant *main* effects that we have found are really nonlinear functions rather than linear. If this were true, then the significant interaction effects that we have seen are really only artifacts of the main variables' nonlinear properties. That is, the nonlinear effects are being "forced" into the interaction terms of each equation, since they essentially have no other means of expression. As a consequence, one could make the argument that nonlinear effects of the main variables, rather than the interaction effects among those variables, are a better representation of our data. We have tested for such a possibility using an earlier version of severe morbidity, unstandardized for the number of patients in a hospital. We have checked for square and square root forms of nonlinearity in our main variables. Although some nonlinear effects of the main variables do appear in the data, there is no indication that the nonlinear model is superior to the interaction model that we initially developed from contingency arguments. For an elaboration of the search for nonlinearities in our data, the reader is referred to Schoonhoven (1976).

DISCUSSION

Analysis of data from the operating room suites of 17 hospitals implied that traditional versions of contingency theory like Galbraith's (1973) underrepresent the complexity of relations between technological uncertainty, structure, and organizational effectiveness. We found multiplicative forms of interaction between technology and structure that are symmetrical and nonmonotonic. Destandardization, decentralization, and professionalization had different influences on effectiveness, which depended on the level of workflow uncertainty. There are several consequences of these findings. First, if we intend to continue making contingency arguments, it is now possible to state our hypotheses with greater clarity and specificity. Those hypotheses should reflect the underlying assumptions of nonmonotonic and symmetrical relations among interacting variables.

Second, the data suggest that the "appropriate for" types of arguments used in contingency theory be amended from an isomorphic low-low, medium-medium, and high-high set of combinations of technological uncertainty and structure, since the relationships found were not simply linear. For example, in Figure 4, the graph showed that increasing decentralization decreases effectiveness when uncertainty is low. This means that the low uncertainty-low decentralization combination was not appropriate and that an equally rigid isomorphic moderate-moderate combination was also not appropriate from an effectiveness standpoint. Decentralization should not be increased as workflow uncertainty increases until uncertainty reaches a value close to the midpoint on the range it takes in an organization. The mean level of uncertainty in our sample was .416. The point of inflection of the partial relation between effectiveness and decentralization was .326, the point at which the effect of decentralization on effectiveness changed signs and effectiveness was enhanced. This means that when more than approximately one-third of an OR's scheduled workflow is subject to change, the benefits of decentralization are realized, and decentralization is "appropriate" from an effectiveness perspective.

Our findings have shown that if the levels of decentralization and destandardization are increased when uncertainty is low, effectiveness suffers. These negative effects take into account the level of professionalization of the workforce. That is, it is not simply inept or ill-trained workers causing effectiveness to suffer, since we have accounted for characteristics of the workforce in the equation for effectiveness. A likely explanation of the decrease in effectiveness is that if even well-trained workers are allowed greater discretion and fewer rules to guide their behavior when work-flow uncertainty is low, management cannot be certain of the decisions and actions that will be taken by the individual workers. Control over worker behavior is reduced, when it need not be. Since rules can be devised and since the hierarchy can absorb the amount of information processing required when uncertainty is low, managers should devise rules, not because it is simply more efficient, but because greater control over outcome quality is gained. It is more effective for the organization.

Substantively, the hypotheses and the findings for destandardization and decentralization were not entirely inconsistent with the usual ways in which we theorize about uncertainty, effectiveness, and these two dimensions of structure. However, with some variable combinations, applying the symmetry assumption produces unconventional and perhaps counterintuitive predictions. For example, our data suggest that increasing the level of professionalization of the workforce is not appropriate along the entire continuum of workflow uncertainty, because professionalization has an undesirable influence on effectiveness in the lower ranges of workflow uncertainty. This suggests a re-thinking of the assumed positive value to an organization of advanced professional training when workflow uncertainty is low. Roth (1974) has raised a similar question in a theoretical article on professionalism.

Why does increasing professionalization when workflow uncertainty is low cause organizations to be ineffective? Two possible explanations come to mind. One is a selective perception argument, and the second is an uncertainty- or variation-creating argument. Selective perception results in amplification of the existing uncertainty. Even though workflow uncertainty is objectively low, as measured by variations in the OR schedule of cases, perhaps the nurses perceive otherwise. Perhaps these workers selectively attend to variation because they are trained to deal with uncertainty and to make judgments. If so, they may misperceive the overall objective characteristics of the work setting and make inappropriate choices, with reduced outcome quality.

A variation-creating argument proposes that nurses may introduce uncertainty and variation into the work setting when it is lacking. Perhaps professionals prefer variety so strongly that, when it is lacking in low uncertainty situations, they vary their approach to the constant set of cases, with inconsistent results that reduce effectiveness in the long run. It may be that the routine workflow begets boredom and subsequent errors in much the same way that errors result when assembly-line workers seek variety to relieve otherwise repetitive operations. It has been reported that automotive workers create diversion on the assembly line, first by not working, and then by working as fast as they can to complete stockpiled work before it reaches the next assembly station (Runcie, 1980). In both cases, the treatment of an otherwise stable set of circumstances is varied. The selective perception and the variation-creating explanations seem equally plausible in the absence of data to explore them. Both might be pursued in future research.

Our objective has been to identify problems within and to improve the specificity of existing contingency arguments. Our data from 17 operating room suites in hospitals have modified some of the substantive arguments made within earlier contingency arguments. Nevertheless, our results are consistent with a more enlightened version of the contingency-orienting strategy in general. The relations that we have found between technology, structure, and organizational effectiveness support an approach to organizational design that begins with the statement that "It all depends. . . ."

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APPENDIX A: Operational Measures of Variables

Workflow Uncertainty

The measure of workflow uncertainty is an index developed from a sample of the operating room schedules compiled by each hospital's OR staff the evening before surgery and revised the next day to reflect the actual work performed. Sampled every four days over eight and a half months, the schedules record the original operations scheduled, the number of surgical cases added during the day's surgery, and the number of surgeries cancelled from the schedule. From these schedules two measures were developed, the proportion of additions to and cancellations from the schedule, which, when combined, express overall change in the workflow of the operating room. The proportion of operations cancelled was computed by dividing the number of operations originally scheduled into the number cancelled. The proportion of operations added was computed by dividing the number of operations originally scheduled into the number of operations added to the schedule during the work day. The two measures are significantly correlated at .39, $p \leq .05$. The actual measure expressing the amount of overall change in the OR's workflow combines the two by adding the number of additions to and cancellations from the schedule, divided by the number of operations originally scheduled.

Structure of the Operating Room

Standardization of rules and procedures was measured by asking the OR staff nurses (by questionnaire) how explicit procedures were regarding the conditions under which staff may be requested to work overtime. This item was taken from a much longer list explored in pilot work and was reverse-scored, so that a value of "1" indicated low destandardization and a value of "5" indicated high destandardization. This item was selected because extensive preliminary field work (using OR nurses and their directors as informants) revealed that the item related specifically to workflow of the OR and that it governed the conduct of the workers themselves. Thus, the measure reflects an area of behavior likely to be governed because of its relationship to variation in the workflow and is task related to the subunit studied rather than to administrative and policy items remote from the subunit of interest.

By focusing on participants' perceptions of explicitness, we believe that our approach provides a more accurate reflection of standardization than the more commonly used measures based on the organization's written documents. By relying on official documents, we encounter the risk that published rules are not enforced, are otherwise disregarded, or at best are a poor guide to actual practice. Consequently, written documents may be of suspect value when measuring the actual standardization of procedures. By asking for the perceptions of staff nurses, we measured the extent to which both documented and unwritten but collectively understood rules existed.

Decentralization of decision making is the second variable of subunit structure. We have argued that subunit uncertainty is most likely to interact with decisions germane to the work in the operating room. Consequently, the measure developed here relates only to decisions relevant to the operating room's tasks. To compute decentralization of decision making for the OR, a two-step procedure was used. First, influence scores for the position of staff nurse and the position of the director of the OR were calculated; then the centralization of influence was determined by subtracting the score of the staff nurses from the score of the director of the OR. The scale was then reversed to reflect decentralization.

The measure combines two questions asked of both staff nurses and the director of the OR. They were asked to rate on a five-point scale the relative influence of several hospital positions with regard to task-relevant decisions: (1) the decision to determine the appropriate disciplinary action for a staff nurse who has committed a serious medication error and (2) the decision to change the rules for scrubbing and gowning for the OR nursing staff. Taken from a pre-test sample of many different decisions, these two cover task-related rather than administrative or policy decisions. Only their judgments about the influence of staff nurses and the OR director were used.

The ratings of influence by staff nurses were averaged and then combined with those of the OR director, giving equal weight to the two ratings. In general, we subscribe to the view that more attention needs to be devoted to determining appropriate weighting schemes for combining data from different organizational positions (Scott et al., 1972: 141), but in this case weighting schemes had little effect on the results because of the high consensus between staff nurses and their head nurses in their judgments of influence (Comstock, 1975a). For example, the correlation between the staff nurses' and the OR director's ratings on the serious medical error decision is .97. As a consequence, weights were not assigned in this situation.

The measure of decentralization for each of the decisions was calculated by subtracting the influence score of the staff nurses from the influence score of their director and was reverse-scored. Measured in this manner, the scores indicated the disparity of influence between the staff nurses and the OR director. The two task-related decision questions displayed convergent validity ($r=.46, p \leq .05$); therefore, the two questions were combined by taking a mean to form a single measure of decentralization.

Following Heydebrand (1973), we indicated professionalization of the workforce by measuring characteristics of the nursing staff of the OR. Heydebrand argued that there is abundant evidence in the literature that it is the nursing personnel who constitute "staff" in the traditional industrial sociology terminology. He argued further that it would be ". . . misleading and theoretically indefensible to use proportion of physicians as the crucial measure of professionalization . . ." (1973: 55). For readers otherwise convinced of the importance of surgeon qualifications in determining surgical quality of care, see Flood's (1976) findings that of seven measures of surgeon qualifications, none reached significance, and most were not in the predicted direction when regressed on measures of surgical mortality and morbidity.

The two measures of professionalization used in this research were devised to distinguish between two dimensions of the variable: initial level of training and the extent to which this training was supplemented and maintained by current professional activities. The two measures were derived from a larger set of five. Among the five, two measured initial level of training (B.S. degree and R.N. ratio), and the remaining three measured the extent of current professional activity (number of articles in professional journals read per month, staff nurse membership in professional associations, and number of professional courses taken during the past year for which certification was received or that significantly enhanced professional knowledge exclusive of in-service training).

Although the two clusters of measures were expected to be at least modestly and significantly correlated to indicate convergent validity, there were no significant correlations within the two clusters. This indicated insufficient convergent validity to justify combining the measures into indices. However, one measure from each dimension was significantly correlated. As a consequence, we selected the two that were significantly, but modestly, correlated (B.S. degree and articles, $r=.57$), and together they represent both dimensions of professionalization described above, which we wished to capture. The first measure was based on the proportion of the OR's nursing staff with a B.S. degree or higher. These data were obtained during interviews with the directors of each OR. The extent of current professional activity was measured by the number of articles in professional journals read per month. Taken from the OR staff nurse questionnaire, the actual measure was the mean frequency response.

Resources

The variable organizational resources was included as a control, since a hospital's resources may affect surgical outcomes. The ability to afford expensive facilities, equipment, and professional staff are among the more obvious means by which resources are thought to influence quality of care and, thus, effectiveness. The measure of resources was expressed as the average expenditures per patient-day, a standard of comparison used frequently among hospitals. It combined in a ratio the three variables of total expenses for 1973, the number of acute care beds, the occupancy rate for 1973, and the number 365, since the ratio is computed per patient-day. Using data from the hospital administrator questionnaire, it was expressed as follows:

$$\text{Resources} = \frac{\text{Expenses for 1973}}{(\text{No. of acute beds} \times \text{1973 occupancy} \times 365)}$$

Effectiveness

We defined effectiveness as an organization's ability to create acceptable outcomes and actions (Pfeffer and Salancik, 1978: 11). Consistent with the definition, we measured the outcomes of surgical care. Although death after surgery is an enviably clean measure of effectiveness, it suffers the disadvantage of being a relatively rare event in today's modern hospital in the U.S. The overall death rate for all patients studied was only 2.8 percent in the 17 hospitals. In order to increase the number of cases available for study in which severely negative consequences followed surgery, the number of deaths within 40 days of surgery was added to the next most severe outcome, severe complications (morbidity) assessed at the seventh day following surgery. Although the number of deaths and the number of patients suffering morbidity were not highly correlated (correlation equals .09), the combination was thought to improve the reliability of the data sufficiently to justify combining them into a single category. If the patient was discharged before the seventh day, the information collected pertained to his or her condition at the time of discharge.

Severe morbidity is described as an Indirect Standardized Adverse Event Ratio (ISAER): the ratio of observed adverse outcomes to the expected adverse outcomes. We describe the indirect standardization method; however, interested readers are referred to Stanford Center for Health Care Research, 1974: 143–150, for greater detail on the statistical treatment of the approach. To permit valid comparisons of surgical outcomes across hospitals, adjustments were made for differences in patient mix within each hospital. The approach was that of indirect standardization, which involves computing the estimated probability of death for each patient. Estimates were empirically derived by using logistic equations relating patient condition variables to outcome measures. The method can be briefly described: first, all study patients of a given surgical category were analyzed together, without regard to hospital. The dependence of the outcome on selected prediction variables was estimated by fitting a logistic function to the data. Prediction variables used were the various measures of patient condition, including physical status, stage of surgical disease, age, sex, stress level, and insurance coverage. Conditional on economic status, insurance coverage indicates the ability to withstand the financial impact of major medical treatment and, thus, is an indicator of care-seeking behavior. Fifteen logistic regressions were computed for severe morbidity, one for each of the 15 operations. The data showed that preoperative conditions, as measured by the model, predicted postoperative outcomes quite well. Second, hospital crude outcome rates were adjusted for differences among patients. An individual patient's probability of an adverse outcome, independent of hospital effect, was estimated using the parameters estimated by the logistic regressions. The expected number of adverse outcomes in a given hospital was simply the sum of its individual patients' probabilities of adverse outcomes. The statistic of interest is then the Indirect Standardized Adverse Event Ratio (ISAER), the ratio of observed adverse outcomes to expected adverse outcomes.

One further adjustment was made. Since the frequency with which study operations were performed varied considerably among the 17 hospitals, some estimates were more reliable than others due to variation in sample size. As a consequence, the standardized ratios were adjusted for their relative reliability by weighting these estimates back toward the mean, using a Bayes adjustment of the ISAER's. It was assumed that the prior and posterior distributions are normally distributed.

We first estimated the amount of variation in hospital outcomes attributable to hospital effects.

Let the true ISAER for hospital *i* be

$$r_i = \frac{E\,(X_{1+})}{p_{i+}}$$

which is estimated by $\hat{r}_i = \dfrac{X_{i+}}{p_{i+}}$

Now

$$\mathrm{Var}\,(\hat{r}_i) = \mathrm{Var}\,[(\hat{r}_i - r_i) + (r_i)]^2.$$

Here we assumed that the (r_i) are independent random variables with variance σ^2. We assumed further that $(\hat{r}_i - r_i)$ is independent of r_i. Therefore,

$$\mathrm{Var}\,(\hat{r}_i) = \mathrm{Var}\,(\hat{r}_i - r_i) + \mathrm{Var}\,(r_i)$$

or

$$\sigma^2 = \mathrm{Var}\,(\hat{r}_i) - \mathrm{Var}\,(\hat{r}_i - r_i).$$

We estimated Var $(\hat{r}_i)$ with the variance of the observed ISAERs and estimated Var $(\hat{r}_i - r_i)$ with the mean binomial variation of the ISAERs. Thus, the estimate of the between-hospital component of variance, σ^2, is given by

$$\sigma^2 = \frac{1}{H-1} \Sigma_i \left[\left(\frac{X_{i+}}{p_{i+}} \right)^2 - \frac{1}{H} \left(\frac{\Sigma_i X_{i+}}{p_{i+}} \right)^2 \right] - \frac{1}{H} \Sigma_i \frac{\Sigma_j p_{ij}(1-p_{ij})}{p^2_{i+}}$$

We estimated the mean of the prior distribution with the population mean of ISAERs, the variance of the prior distribution with the hospital component of variance estimate, and the conditional variance of the posterior by its binomial variation. Then, the Bayes-adjusted ISAERs ($\tilde{r}_i$) are given by

$$\tilde{r}_i = \frac{w_i \cdot \hat{r}_i + w \cdot \bar{r}}{w_i + w},$$

where $\bar{r} = \frac{1}{H} r_{+},$

$$w_i = \frac{\sum_j p_{ij}(1-p_{ij})}{p^2_{i+}},$$

and $w = \frac{1}{\sigma^2}$.

The zero order correlations of workflow uncertainty with destandardization, decentralization, and the two dimensions of professionalization were .29, .12, .01, and –.02. None were significant at $p \leq .05$. The correlations of destandardization with decentralization and the dimensions of professionalization were –.12, –.02, and .32; none were significant. The correlations of decentralization with professionalization were –.06 and –.29; neither was significant. With any kind of interaction model that combines elements of independent variables in the model, one faces the possibility of multicollinearity. Blalock noted that when ". . . the original variables are themselves highly intercorrelated, or belong in blocks, that the cross product terms will be related to these blocks in peculiar ways" (1972: 464). The low levels of association among independent variables, none of which were statistically significant, indicated that subsequent regression analyses would be relatively free of problems of multicollinearity.

Measures of Technology, Structure, and Effectiveness

	Mean	S.D.	Range (Min/Max)
Technology			
Workflow uncertainty within OR	.412	.136	.191– .718
Structure			
Destandardization	2.349	.719	1.000–4.360
Decentralization	2.885	.581	2.000–4.333
Professionalization			
Professional training	.046	.058	.000– .170
Professional activities	2.548	.373	1.940–3.260
Effectiveness			
Severe Morbidity	.999	.245	.555–1.447
Resources			
Resources 1973	.113	.025	.077– .154

APPENDIX B: Analytic Technique: Main and Interaction Effects

In the table of regressions, we observed three interaction terms. The uncertainty-destandardization interaction, the uncertainty-professionalization interaction, and the uncertainty-decentralization interaction had effects on severe morbidity in the hypothesized direction. The effect of each of these interaction terms can be interpreted in two ways, depending upon assumptions that one is willing to make about the main effects corresponding to each interaction. Of the two variables contained in each interaction, one must make explicit which variable is presumed to modify the other independent variable's effects on a third, dependent variable. For example, we can look at a simple two-variable regression, which includes one first order interaction:

$$Y=a+b_1X_1+b_2X_2+b_3X_1X_2+e. \tag{2}$$

In the above regression, the interaction term, if significant, may be interpreted as changing the coefficient b_1 or b_2. If the first were the case and we interpreted the interaction as altering the effect of X_1 on Y, then the following partial of the regression equation would be analyzed:

$$Y=b_1X_1=b_3X_1X_2$$
$$Y=X_1(b_1+b_3X_2). \tag{3}$$

Were this the case, then we would be interested primarily in the behavior of X_1 and how its effect is modified by X_2.

From a mathematical point of view, we could just as readily interpret the interaction term as affecting the relationship between X_2 and Y. In this second case, we would analyze the following partial of the regression equation:

$$\begin{aligned} Y&=b_2X_2+b_3X_1X_2 \\ &=X_2(b_2+b_3X_1). \end{aligned} \tag{3a}$$

This would imply an interest in the effect of X_2 on Y and how its effect is modified over the range of X_1. The choice between the two partials is determined by the substantive assumptions that one is willing to make. Mathematically, the two are equally valid.

When analyzing the interaction terms in this analysis, we have taken the position that the structure of a unit can be modified more readily than the level of technological uncertainty that faces a unit. We assumed that the impact of a dimension of structure on effectiveness will vary over the range of uncertainty. As a consequence, uncertainty will always appear on the horizontal axis in the graphs as the variable that alters the impact of the structural variable on severe morbidity.

The interpretation of each significant interaction was a two-step procedure. First, we determined if the modified relationship was monotonic or nonmonotonic. Then we plotted the relationship between the modified variable and the dependent variable over the range of the modifying variable. The effect of a modifying variable on the additive relationship will be either monotonic or nonmonotonic, depending on the relative value of the coefficients for the interaction and additive terms. If we take the position of being interested in X_1 and how it is modified in interaction with X_2, Equation (3) above, where

$$Y=b_1X_1+b_3X_1X_2, \tag{3}$$

may be rewritten as a partial derivative, where

$$dY/dX_1=b_1+b_3X_2. \tag{4}$$

Equation (4) indicates that the effect of X_1 on Y is a function of X_2 and the values of b_1 and b_3. The point where the effect of X_1 on Y is zero, or where

$$dY/dX_1=b_1+b_3X_2=0, \tag{5}$$

is also where X_2, the modifying variable, is equal to the ratio of the coefficients of the additive and interaction terms:

$$X_2=-b_1/b_3. \tag{6}$$

This is the point on the range of X_2, the modifying variable, at which X_1, the variable that is modified, has no effect on the dependent variable, Y. That is to say, it is the point of inflection of the partial relation dY/dX_1. If the value for X_2 obtained from Equation (6) falls within the observed range of X_2 in our sample, this is the point at which the effect of X_1 on Y will change signs. As a consequence, the effect will be nonmonotonic: negative over a portion of the observed range of the modifying variable, X_2, and positive over the remainder of its range.

After we calculated Equation (6) to determine if the relationship was nonmonotonic, we than used Equation (4) to plot the effect of the modified variable on the dependent variable over the range of the modifying variable, that is, the relation dY/dX_1. Although several patterns are possible, our data revealed consistently nonmonotonic patterns. That is, the modifying variable, X_2, increased the effect of X_1 on Y over a portion of its range and decreased it over the remainder.

Effects of Organizational Strategies and Contextual Constraints on Centrality and Attributions of Influence in Interorganizational Networks

David M. Boje
and
David A. Whetten

This study examines the effects of organizational strategies and contextual constraints on location in interorganizational transaction networks and the effects of strategies, constraints, and network position on attributions of influence. A model of these effects is presented, and eleven propositions specific to social service organizations are examined. In client referral networks in 17 communities, it was found that centrality in referral flow, in communication exchanges, and in joint program activities was positively associated with attributions of influence. A revised model is tested using path analysis.•

INTRODUCTION

From an exchange perspective, there are two important dimensions of interorganizational networks. These are the horizontal differentiation of transactions into more or less stable subsystems and the vertical differentiation of organizations into a dominant elite core and a more dependent and less powerful periphery. Recent refinements in exchange theory have sought to clearly conceptualize the emergence of power differentials and other patterns of vertical dominance in relations among organizations (Aldrich, 1972; Benson, 1975; Cook, 1977). To date, however, most interorganizational network studies have focused on horizontal differentiation, with the result that there is little information about patterns of dominance among organizations.

Most current network methodologies, particularly blockmodeling (Breiger, Boorman, and Arabie, 1975), are designed to statistically derive a model of an interorganizational system composed of a set of specialized subsystems. Recent studies using this perspective include Van de Ven, Walker, and Liston (1979), Knoke and Rogers (1979), and Galaskiewicz (1978). While these studies move one step beyond dyadic interorganizational studies, they have two deficiencies. First, they are basically descriptive. The principal objective has been to adapt matrix modeling techniques to interorganizational settings, but applications of these techniques have typically examined only a single network, usually in one community (e.g., Stentz, 1972; Rieker, Horan, and Morrisey, 1976; Van de Ven, Walker, and Liston, 1979). Second, they consider only horizontal differentiation, ignoring the need to study power and status differentiation. The present study, along with the recent work of Laumann and Pappi (1976), Rogers and Maas (1979), and Galaskiewicz (1979), examines vertical differentiation in interorganizational networks.

Network Centrality and Influence

Vertical differentiation refers to the natural tendency for social system actors to become differentiated according to an explicitly acknowledged and enforced status hierarchy. The power-dependency perspective (Emerson, 1962; Cook, 1977) and the resource-dependency perspective (Yuchtman and Seashore, 1967; Benson, 1975; Aldrich, 1976; Aldrich and Pfeffer, 1976; Pfeffer and Salancik, 1978) posit that power is derived from control over strategic interdependencies. Power can be accrued in an exchange network by gaining control over various types of valued resources. These include information, monetary supplies from outside the network, and alliances.

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Centrality in Interorganizational Networks

A basic postulate of power theories is that network centrality enhances power because the ability to control valued resources increases as a function of proximity to the core of a system of transactions. The relationship between power and network centrality has been researched most extensively in the small group communication network literature (Bavelas, 1948, 1950; Leavitt, 1951; Guetzkow and Simon, 1955; Davis, 1969; Shaw, 1971). Bavelas developed a sociometric measure of relative centrality in communication networks by counting the number of communication channels required for actors to reach other actors and then determining which actors could communicate most readily with others.

The relationship between network centrality and power was tested at the organizational level by the Aston group (Hinings et al., 1974). In their study of the determinants of intraorganizational power, they found a modest positive correlation between the power attributed to a work unit and its centrality in the organization's workflow — as measured by the number of links it had with other work units.

At the interorganizational level, the relationship between network centrality and attributed influence was postulated by Benson (1975) and Cook (1977) and tested in single networks by Laumann and Pappi (1976) and Galaskiewicz (1979). However, the extent to which the dynamics of influence attribution in interorganizational networks parallel those previously observed in interpersonal and interdepartmental networks is not known.

While it is evident that vertical differentiation occurs at group, intraorganizational, and interorganizational levels, the manner in which status hierarchies emerge in interorganizational networks may differ from the manner in which they emerge at less aggregated levels. Specifically, it appears that intraorganizational and interorganizational networks differ in two fundamental ways. First, group and organizational networks are consciously imposed. They are based on experimental manipulations, in the case of the small group research, or on a formal division of labor in organizations. While a system of informal interactions frequently develops to supplement the formal structure in these settings, most network research has examined only the formal structural configuration of an organization or group. In contrast, interorganizational networks are emergent in nature. While some relationships are mandated, most are locally initiated and arise from the needs of network participants.

The second principal difference between intraorganizational and interorganizational networks is visibility. In an experimental small group setting, network configuration is denoted by the physical arrangement of participants. In organizations, the structural arrangement of departments and work groups is represented graphically on organization charts. At the interorganizational level, however, representations of a network's configuration are seldom published, and, consequently, participants must construct their own. As a result, it is more difficult for participants to perceive the dynamics underlying the relationship between network centrality and attributed influence in interorganizational networks.

A CAUSAL MODEL

The purpose of this study was to develop and test a model of network centrality and attributed influence that would reflect the unique characteristics of interorganizational networks. It was evident that the configuration of an interorganizational network at a given time was a consequence of past efforts by member organizations to enhance their power relative to that of other network members (Aldrich, 1979; Galaskiewicz, 1979). Interviews conducted for this study suggested that an organization's concern for improving its prestige among other organizations strongly influenced its policy and program decisions. Therefore, an investigation of the strategies used in this "jostling for position in the pecking order" (in the words of one respondent) was deemed important in a study of interorganizational network centrality.

It has also been demonstrated that a public agency's position in a local resource exchange network is significantly affected by funding and policy decisions originating outside the network. For example, Whetten and Aldrich (1979) found that the best predictors of the size and diversity of a public agency's set of interorganizational relations were organizational characteristics over which local administrators had little control. These included level of funding and diversity of services. Therefore, a predictive model of the determinants of an organization's position in a network, and its accompanying position in the status hierarchy, must include both strategic initiatives of the organization's members and the constraints imposed on the organization by regulatory and funding bodies. The model shown in Figure 1 incorporates these considerations.

This model draws heavily on Burt's (1977) typology of power. He argues that there are three aspects of power: control of resources as the bases of power; processes converting the bases of power into the manifestations of power; and the network of influence relations as manifestations of power. Burt criticized the common practices of equating power with control of resources or perceived influence, since both equations hold as unproblematic the process of translating control over resources into the distribution of influence among actors in a system.

The model in Figure 1 includes all three aspects of Burt's typology. Organizations formulate strategic plans to improve

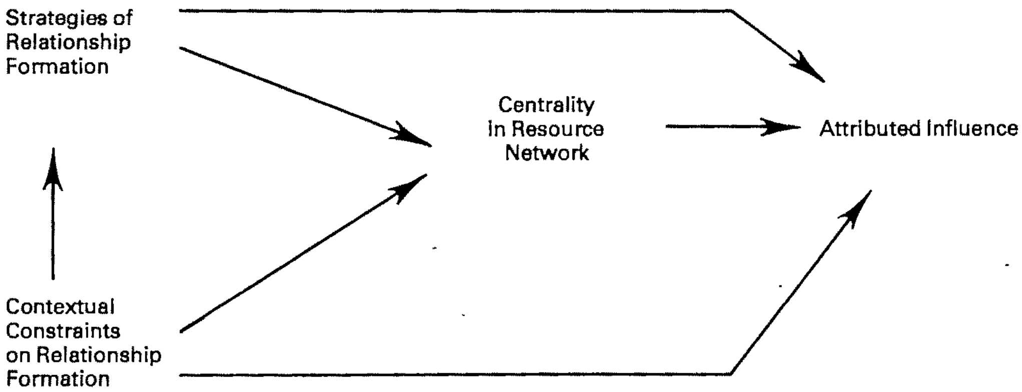

Strategies of Relationship Formation
Centrality In Resource Network
Attributed Influence
Contextual Constraints on Relationship Formation

Figure 1. A causal model of centrality and attributed influence in an interorganizational network.

their resource transaction position. However, this is limited by contextual constraints. Over time, strategies and constraints combine to determine the organization's position in a local resource exchange network. Out of the structure of dyadic exchanges emerges a network configuration wherein a position of centrality enables an organization to control the flow of resources between more peripheral actors. Network position becomes translated into attributed influence as others attribute to central actors greater potential for establishing coalitions to enhance their political influence. Galaskiewicz (1979) found that network centrality was a better predictor of attributed influence than size of resource base, because network members assumed that central actors had greater potential for mobilizing resources controlled by others. This result was consistent with Perrucci and Pilisuk's (1970) finding that persons influential in a community held positions in a significantly larger number of community-based organizations than persons not judged to be influential. By occupying multiple positions, these people were strategically located at the intersections of communication and resource networks and were, as a result, viewed as potential coalition builders.

The link between network centrality and attributed influence in the model does not mean that a person's rating of an organization's influence represents explicit knowledge of the organization's location in a resource exchange network. Instead, it is proposed that the behaviors of individuals in an organization reflect the organization's network location. Members of a central organization may indicate the organization's location by serving as authorities on changes in policies and procedures in other organizations, by acting as arbitrators in conflicts between other organizations, or by serving as brokers in the formation of coalitions between other network members. All of these activities represent clues regarding network location. They also serve as criteria for judgments about organizational influence. Hence, it is proposed that influence is attributed to centrally located organizations in an interorganizational network because observed differences in the day-to-day activities of members of those organizations cause members of other organizations to attribute more influence to them.

Organizational activities reflecting current network location are not the only criteria used in the influence attribution process. Attributions of influence may reflect aggressive behaviors intended to increase an organization's centrality in the network. The model proposes that these strategic actions will have an independent effect on attributed influence. An aggressive leadership style conveys an image of power before an organization actually moves into a central position in the network. Examples of this style include establishing a broad communication network, inviting administrators from other organizations to serve on a board of directors and serving as an advocate for the network's interests in the public policy arena.

Attributions of influence may also be based on inherent organizational characteristics. These are designated as contextual constraints in the model and include the number of services offered and the size of an organization's staff. These aspects of a public organization reflect regulations and resource allocation decisions made by state or federal officials.

Contextual constraints are an important component of this model for two reasons. First, they influence an organization's choice of strategies and thus its location in a network. For example, an organization with a small staff is unlikely to establish an elaborate communication system with other network members. The resulting lack of visibility will reduce its resource flow and hence lower its centrality in the resource network. Second, contextual constraints are directly visible to other organizations and thus directly affect influence attribution. For example, while a local organization's administrator generally has little control over the services offered to clients, this organizational feature is known throughout the network. As a result, network members may attribute greater influence to those organizations that provide a wide range of services to a broad constituency.

In summary, the model states that a favorable combination of constraints and strategies will enable an organization to become central in a resource exchange network. The highly visible initiatives taken by central organizations will, in turn, lead peripheral actors to attribute greater influence to them.

PROPOSITIONS

Eleven propositions regarding the determinants of centrality and influence in interorganizational networks were chosen as tests for the model of the emergence of a network hierarchy. These propositions pertain specifically to social service organizations and were derived from a review of interorganizational literature, previous research by the authors, and exploratory interviews conducted at the beginning of this study. Proposition 1 establishes a relationship between network location and attributed influence. Propositions 2 through 5 concern the effects of strategies on referral centrality and attributed influence. Propositions 6 through 11 concern the effects of contextual constraints on centrality and attributed influence. Operationalizations of these propositions are shown in the Appendix.

Attributed Influence as a Result of Centrality

Proposition 1. Relatively central organizations will have greater influence across three types of network relationships: (1) referral exchanges; (2) joint program strategies; and (3) formal and informal strategic communications.

This research examined three types of exchanges between social service organizations, as noted in the proposition. In each of these exchange relationships, it was proposed that being more central in an exchange network will have the positive outcome of improving an organization's attributed influence. Client referral is clearly the most important of these forms of exchange for manpower organizations. Clients can be viewed as: (1) a generalized resource, because they are used to obtain other resources, such as funds; (2) a liability requiring greater investment of other resources, such as funds and personnel; or (3) an idealized purpose, valued by actors who have been socialized into a professional commitment. Regardless of an agency's motivation for exchanging clients, these transactions represent the most important purpose for developing an interorganizational network among these agencies. Consequently, strategies to achieve centrality in communication and joint program networks can be viewed as strategies to enhance position in the referral network.

Centrality scores in the communication and joint program networks were used in two ways in this study. First, these scores were treated as predictors of reputational influence, along with centrality in the referral network, as stated in proposition 1. Second, they were viewed as strategic actions used by an organization to increase its centrality in the referral network.

Organizational Strategies Affecting Referral Centrality

Strategies for establishing interorganizational referral linkages include: establishing joint programs; engaging in formal and informal communications with other organizations; inviting administrators of other organizations to serve on an advisory board; and targeting services to particular clients in the system.

Proposition 2. A joint program strategy will increase the flow of clients through an organization and enhance its attributed influence.

Joint programs with other organizations can ensure an adequate supply of clients or suitable output capacity for clients. While a joint program results in a certain loss of autonomy, it gives an organization access to more resources and increases the possibilities for referral exchange.

Proposition 3. Strategic formal and informal communication linkages will increase both an organization's knowledge of critical contingencies affecting attributed influence and its client intake and output options.

One important strategy in interorganizational networks is selectivity in the release of information about activities and preferences (Rogers and Maas, 1979). While the resource-dependence model treats information as a resource, advocates of an information-processing model (e.g., Pondy, 1977) argue that information is the medium through which influence and control are transmitted. Examples of this are supplying other organizations with strategic information about agency activities and initiating personal communication with decision makers in other organizations in order to frame decision premises, define alternatives, influence actual decisions, or block implementation of decision results (Bachrach and Baratz, 1970). The present study examined two communication mediums: formal transmittal of written correspondence, brochures, and program announcements; and interpersonal exchanges between organization representatives.

Proposition 4. The placement of administrators from other organizations on an advisory council or board of directors will enhance influence with organizations referring clients or providing services.

Cooptation, which Thompson (1967: 35) defined as "the process of absorbing new elements into the leadership of the policy-determining structure of an organization as a means of averting threats to its stability and existence," is an important strategy in interorganizational relations (Pfeffer and Salancik, 1978). One way to increase network centrality is to create advisory councils or boards of directors on which elite members of other organizations are invited to serve. This strategy increases a social service organization's visibility and legitimacy with organizations that provide clients and services. In addition, because of their stake in the success of the organization, board members may volunteer resources, information, and expertise.

Proposition 5. Providing services for clients who are less difficult to treat will facilitate the maintenance of a large number of interorganizational relationships, which will increase attributed influence.

A strategy of some agencies is to conserve resources such as funds, personnel, and equipment by refusing to accept clients who are difficult and costly to serve successfully. This can be an effective strategy, since the overall quality and quantity of services provided by an organization is reduced by admitting clients who have no hope of rehabilitation. Organizations that accept difficult cases expend their scarce resources on a few clients. Thus, they are unable to handle large numbers of linkages with other organizations and are unlikely to be central actors in a referral network.

Constraints upon Referral Centrality

Autonomy of local organizations, organization size, geographic proximity to other organizations in the network, ideological consensus, mandated relations, and interpersonal ties with staff members of other organizations will have a demonstrable effect on centrality and attributed influence.

Proposition 6. Locally administered organizations will be better adapted to local constraints and will therefore have greater attributed influence than state or federal organizations.

Levine and White (1961) and Galaskiewicz (1979) proposed that locally administered organizations will be more responsive to local conditions and thereby gain advantage over externally administered organizations. Interviews conducted for this study with administrators in both types of organizations suggested that administrators of federal and state agencies believe they must follow the dictates of central offices. These dictates function as contextual constraints.

Proposition 7. Larger organizations, in terms of number of staff members and number of services offered, will be less constrained in obtaining and making client referrals and will have more attributed influence.

Kimberly (1976) argued that different measures of size have different theoretical implications and are, in general, lumped together without attention to those differences. The present study examines two measures of size: number of staff members and number of services. Both measures are predicted to be positively associated with referral centrality. A large staff tends to increase an organization's visibility in the community. A large organization can maintain more interorganizational ties, can process more clients (Galaskiewicz, 1979), and can offer a wider range of services (Rogers and Maas, 1979). Offering numerous services, in turn, enables the organization to establish linkages with a variety of interorganizational networks and client pools.

Proposition 8. Organizations more geographically proximate to other community organizations will receive more referrals and will consequently have more attributed influence.

Proximity should enhance referral flow between organizations because it facilitates communication between staff members, increases the chance of random contract between staff members, and reduces the referral costs borne by clients. Rogers and Maas (1979) found that proximity was significantly related to the number of joint programs established between social service agencies in 16 counties. Several respondents in the sample for the present study stated that relations between the members of nearby organizations were better because of increased opportunities for frequent interaction among staff members. These respondents also proposed that proximity increased referral flow because clients were more likely to travel between organizations.

Proposition 9. Organizations having ideologies dissimilar to the ideologies of other network organizations will be less central and will have less attributed influence.

The resource dependence model of interorganizational relations de-emphasizes the role of ideology (Benson, 1975; Aldrich, 1976). Economic and political factors are held to be more salient. This view is buttressed by examples of organizations that have transformed their ideologies in the face of changing resource circumstances (Clark, 1965). An opposing view has been proposed by the authors of several empirical studies (e.g., Warren, Rose, and Bergunder, 1974). These authors proposed that ideology is an antecedent that defines acceptable exchange relationships. The position taken in the present study is that decision makers operate within a fairly wide zone of indifference regarding this criterion for selecting exchange partners. As long as there is not a wide discrepancy in ideology, it will not be a salient issue. However, organizations with ideologies that deviate sharply from the norm will be located on the periphery of the referral network.

Proposition 10. Organizations having a greater number of imposed relationships with other organizations will be more likely to be central but will have less attributed influence.

Referral linkages between manpower organizations are sometimes mandated by law (Hall et al., 1977). It is predicted that increased centrality in the referral network will occur as a result of these mandates (Aldrich, 1976). However, there is likely to be a decrease in attributed influence, since mandated relationships will increase vulnerability to the demands of other organizations and will decrease autonomy. Attributed influence will decrease as perceived fate control decreases (Pondy, 1977; Whetten and Leung, 1979).

Proposition 11. Organizations having a large number of interpersonal ties with other organizations will be more able to take a central position in the referral network and will have more attributed influence.

Interpersonal ties between organizations increase knowledge of exchange opportunities and increase the predictability of the exchange process (Whetten and Aldrich, 1979). In the present study, a distinction was made between social ties — such as those based on club memberships, attending the same schools, or growing up together — and work ties. It is predicted that work ties, such as transfer of persons from one agency to another, will have a stronger effect on referral centrality than social ties because the former will produce more relevant information.

METHOD

Manpower Networks

This study was conducted in 17 communities of a large midwestern state. Each community was treated as a population of organizations within which business, government, and social service agencies were treated as distinct sectors. After conducting field interviews and compiling lists of social service agencies in the communities, it was possible to separate each sector into action sets (Aldrich and Whetten, 1981). One of these action sets consisted of public, voluntary, private for-profit, private not-for-profit organizations, and religious and ethnic interest groups providing manpower services to economically disadvantaged adults. These organizations provided both people-changing and people-processing services (Hazenfeld, 1972). Their technologies were labor intensive and their staffs varied considerably in professional background and orientation. Manpower organizations included in the study offered at least one of three kinds of services: (1) outreach; (2) counseling, advocacy, training, or rehabilitation; and (3) placement in public or private sector jobs.

Data Base

Data for this study were generated from interviews with the top administrators of 316 manpower organizations in the 17 communities. The number of organizations in each community network ranged from 15 to 27, with an average of 18.6. The key informant approach to data collection (Seidler, 1974) was used. While agency administrators have been shown to be poor informants for specific details of interorganizational exchanges (Whetten and Szwajkowski, 1978), analysis of respondent bias in similar organizations showed that these agency directors would be able to provide the information requested in this survey (Whetten and Leung, 1979). Their familiarity with this information is greater because of the small size of these organizations (mean staff size of 23.2) and the practice of appointing agency directors from within the staff. There were a few cases where a director had been in the agency for less than six months and was unable to answer all questions. In these instances either an assistant or a line supervisor was also interviewed.

Two additional data sources were used. Agency documents were reviewed and, in the case of public agencies, telephone interviews were conducted with regional, state, and federal level administrators.

The data were analyzed as one large population of 316 organizations. The study was conducted in 17 counties so that the effect of county-level contextual factors on network configuration could be examined. This analysis will be presented in a subsequent paper. It was expected that county characteristics would affect overall network characteristics (e.g., dispersion, size) but would not affect the location of an individual organization in a network. Two tests were conducted to determine whether county characteristics were contaminating analyses of the determinants of organizational location. First, dummy variables for each county were added to the two regression equations shown in Table 2. None had significant betas. Further, the addition of the dummy variables added only 2 percent to the R^2 in both equations. Second, community size, various poverty indicators, indicators of economic activity, and network size were controlled for. Effects were again found to be insignificant.

Measures of Attributed Influence and Centrality

Attributed influence was measured by asking respondents to identify the network members they felt were particularly influential in shaping the formation of policies related to employment and training activities (Laumann and Pappi, 1976; Galaskiewicz, 1979; Rogers and Maas, 1979). Centrality scores were computed using the Diagraph Analysis Program developed by Laumann (1977). The program first calculates a reachability matrix based on binary data. Reachability is defined as the minimum number of links required for one organization to reach another. It represents, therefore, both direct and indirect ties in the network. In the present study centrality was measured as an organization's distance from the centroid of the reachability matrix. In the case of referrals, more central organizations were those having the greatest number of referral ties to other organizations and having the shortest reachability paths in their indirect ties to peripheral organizations. Relative centrality was calculated similarly for joint program networks, formal communication networks, and informal communication networks. Since the magnitude of centrality computations will be severely affected by the number of actors in a network, centrality scores were standardized for each county to allow for comparison across networks.

RESULTS

To test proposition 1, network centrality in four types of interorganizational relationships was examined to determine if relative centrality was associated with greater attributed influence. To test propositions 2 through 11, the effects of organizational strategy and contextual constraint variables on referral centrality and attributed influence were examined. To test the model of interorganizational network relations in Figure 1, the causal links between constraints, strategies, referral network centrality, and attributed influence were tested using path analysis.

Evaluation of the Propositions

The correlations in Table 1 were supportive of proposition 1. The mean correlation was .60. Attributions of influence appeared to be related to position in the four networks. From this data it was not possible to ascertain whether these attributions of influence were the result of dominating behaviors or simply of the visibility afforded central actors. Information from interviews suggests that the behavior of central organizations was

Table 1

Correlations Among Centralities in Four Networks and Attributed Influence (N=316)*

		S1†	S2	S3	Y1
S1	Joint programs				
S2	Informal communication	.76			
S3	Formal communication	.65	.61		
Y1	Referrals	.58	.61	.60	
Y2	Attributed influence	.66	.68	.57	.56

*All correlations are significant at the .001 level.

†S=strategy variable; Y=dependent variable.

Table 2

Separate Regressions of Referral Centrality and Influence on Strategies and Constraints (*N*=316)

Strategies & constraints		Referral centrality Y1*	Attributed influence Y2
S1†	Joint programs	.19•••	.22•••
S2	Informal communications	.24•••	.29•••
S3	Formal communications	.27•••	.17•••
S4	Advisory board	—	—
S5	Difficult clients	–.15••	—
C1	External administration	—	.14••
C2	Staff size	—	–.11••
C3	Service size	.14••	.17••
C4	Proximity	.08•	—
C5	Ideological conformity	—	—
C6	Mandated ties	.36•••	–.10••
C7	Interpersonal ties	—	—
C8	Previously worked together	—	.17•••
R^2		.60•••	.60•••

•*p* <.05; ••*p* <.01; •••*p* <.001

*Y=dependent variable

†S=strategy variable; C=constraint variable

the basis for these judgments. For instance, CETA was one of the two most central actors in 13 of the networks. CETA was repeatedly described as "the richest kid on the block." "They used their money and clout to muscle into old established organizational cliques." It appeared that people were attributing power to CETA on the basis of its actions associated with its movement into the center of the manpower network.

Table 2 displays the regressions of referral network centrality and attributed influence on strategies and constraints. The results for joint program and communication strategies (S1 through S3) were all in the predicted directions. Working with the more difficult-to-serve clients (S5) had no relation to attributed influence and was inversely related to referral centrality. Hence, as predicted, problematic clients were being processed by peripheral organizations. Offering advisory board seats to other agencies (S4) appeared to be a weak strategy. It neither improved referral centrality nor increased attributed influence. These results provided strong support for propositions 2 and 3, concerning joint programs and communication, moderate support for proposition 5, concerning difficult clients, and no support for proposition 4, concerning the use of advisory councils.

Contrary to the prediction of proposition 6, external or local administration did not significantly affect referral network centrality. Further, administration by a federal or state body increased the likelihood that an organization would be considered highly influential. One explanation for this unpredicted result is that the federal and state sponsored agencies tend to be the older and better established members of the manpower systems. Perhaps deference is given to this "old boys' " network.

Using separate indicators of size proved to be a useful approach. Staff size and service size were related quite differently to both referral network centrality and attributed influence.

Maintaining many services was positively associated with centrality and attributed influence, while having a large staff was inversely related to attributed influence. One explanation may be that the agencies in the present study all had small staffs (mean of 23.5), so that staff size was not a meaningful variable in this sample. Another explanation might be that smaller staff size indicated a strong professional orientation, which would tend to make an agency more responsive to the needs of other network members. Large organizations may have been perceived negatively as being preoccupied with internal bureaucratic operations and procedures.

Geographic proximity showed a slight positive relationship to referral network centrality. One explanation for the weakness of this result is that the agencies were simply not dispersed enough for differences to be significant. Rogers and Maas (1979) found that geographic proximity was a significant predictor of joint program formation between rural development organizations. Since those organizations tended to be more widely dispersed than manpower agencies, whose clients tend to be concentrated in urban centers, proximity would probably play a more significant role in rural settings.

Ideology was not predictive in either of the regression equations. This result supports the resource dependency position that ideology is not an important consideration in interorganizational relations. Political and economic rather than ideological interests would appear to be paramount in these networks.

The betas for mandated ties (C6) supported the logic of proposition 10. While this constraint was positively related to referral network centrality, it was negatively related to attributed influence. Mandates produced a larger volume of referrals but limited an organization's options in selecting relationships. Hence, organizations constrained by many mandates were viewed as having less influence over manpower policies.

Finally, only one of the two measures of interpersonal ties, having previously worked with members of other organizations, was significant. While work ties were apparently not being used to generate referrals, they did enhance an organization's visibility in the network and, thus, its attributed influence. This is similar to the finding in Whetten (1978) that community leaders' ratings of manpower organizations were related to extensive staff participation in extraorganizational activities. Visibility appears to have a significant influence on how others perceive and evaluate these organizations.

In summary, the separate regression analyses of network centrality and attributed influence gave partial support for propositions 7, 8, and 10 and no support for propositions 6 and 9.

A Path Analysis Test of the Causal Model

These results were an incomplete test of the model in Figure 1, since they did not show the relative contributions of the strategy and constraint variable sets on the referral process, nor did they show how strategies, constraints, and referral network centrality combined to account for attributed influence. In order to fully test the model, it was necessary to reduce the number of strategy and constraint variables, since a path analysis model with 15 variables would be virtually incomprehensible. The

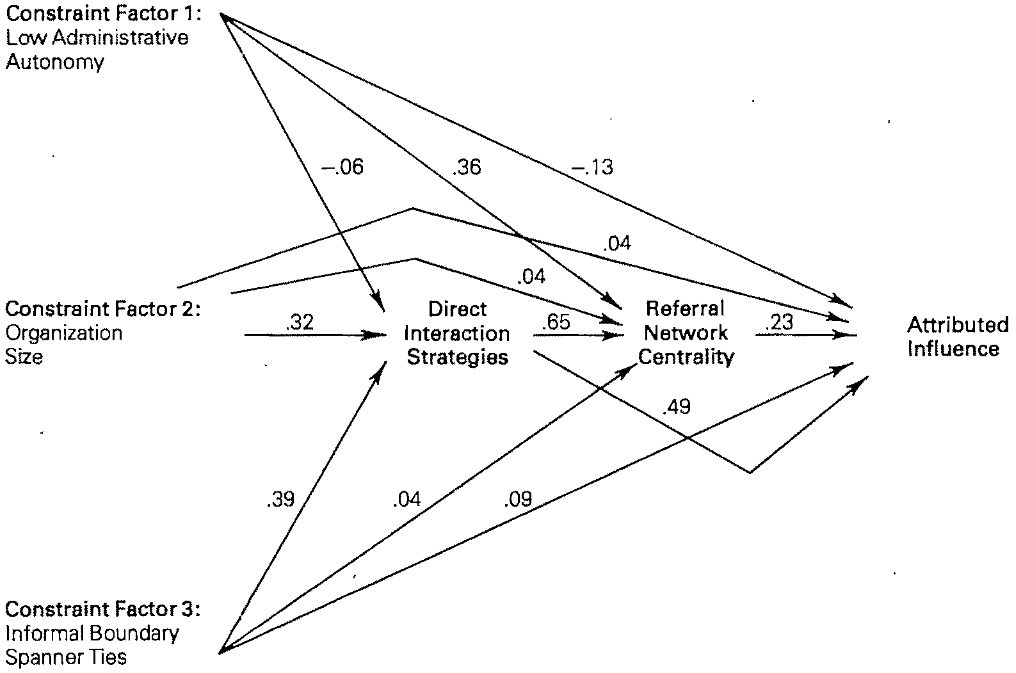
Table 3

Results from Factor Analysis of Strategies and Constraints Variables*

Variables	Factors		
Strategies	SF1	SF2	
S1 Joint programs	.89	.19	
S2 Informal communication	.83	.13	
S3 Formal communication	.77	−.20	
S4 Advisory board	.22	.15	
S5 Difficult clients	.02	.57	
Percent variance explained	.85	.15	
Constraints	CF1	CF2	CF3
C1 External administration	.64	−.04	−.13
C2 Staff size	.06	.52	−.17
C3 Service size	−.18	.49	.07
C4 Geographical proximity	−.02	−.03	.18
C5 Ideological conformity	.10	.21	.00
C6 Mandated ties	.92	.12	.01
C7 Interpersonal ties	.00	.38	.54
C8 Previously worked together	−.09	.26	.57
Percent variance explained	.49	.41	.10

*The SPSS Factor Analysis program was used in this analysis. Factors were rotated using the varimax technique.

strategy and constraint variable sets were therefore factor analyzed separately. The results are shown in Table 3. One factor (SF1) emerged from the five strategy variables that explained 85 percent of the variance. This factor reflected direct interaction strategies used by organizations to increase their centrality in the referral network. Since it accounted for 85 percent of the common variance between these five strategy variables, and since the second factor had only one variable with a high loading, only the first factor was used in subsequent analyses.



Note: The R^2 for referral centrality and perceived influence is .56.

Figure 2. Path analysis of a revised causal model.

Three interpretable factors emerged in the factor analysis results for the constraint variables. The first factor (CF1) reflected low administrative autonomy due to the effects of centralized control of externally administered programs and legal requirements to interact with a large number of other organizations. The second factor (CF2) represented the scale of an organization's operations, measured by the size of its staff and the number of programs it offered. The third factor (CF3) reflected the use of informal interorganizational relationships between staff members. Although the third factor only explained 10 percent of the variance, it was included in subsequent analyses because it represented a neglected aspect of interorganizational relations.

Using these factors, a path model was constructed. The results of analysis of this model are shown in Figure 2. First, the effect of dropping two strategy variables and two constraint variables and grouping the remaining variables into four indices on the predictive power of the model proved to be modest; the R^2 for attributed influence only dropped to .56 from .60. Second, the direct effects of referral network centrality and strategies on attributed influence were significant, as predicted. Third, the direct effects of the three constraints on attributed influence were not significant. Fourth, the indirect effect of strategies on attributed influence through referral network centrality was substantial (.15). Fifth, two of the constraint indices (CF2 and CF3) had significant effects on strategies, as predicted. Sixth, only one of the constraint indices (CF1) had a significant effect on referral network centrality.

These results suggest two modifications of the model in Figure 1. First, the arrow from constraints to attributed influence should be dropped. While contextual constraints affected the attribution of influence among network members, Figure 2 shows that this effect was indirectly transmitted through referral network centrality and strategies. Second, the constraints variable in the model should be disaggregated to show different types of constraints having different relationships with other variables in the model. Specifically, low administrative autonomy (CF1) appeared to affect the network location of an organization. Organizational size (CF2) and informal ties between boundary spanners (CF3) appeared to constrain an administrator's choice of strategies for establishing linkages with other network members. The observed effects of constraints on strategic choice and on referral centrality were both predicted by our model, but results point out the need for further refinement of the constraint construct to pinpoint the specific effects of various types of constraints.

CONCLUSIONS

Four conclusions may be drawn from this study. First, these results demonstrate the value of including both organizational strategies and environmental constraints in a model of interorganizational relations. Recent theoretical work by Boje (1980a, 1980b) and Rumelt (1979) has asserted that studies of organizational strategy and studies of population ecology make widely different assumptions about the role of strategic choice and environmental constraints in interorganizational relations. This model offers a means of integrating the two schools of thought.

Second, the results show that there are both costs and benefits associated with externally imposed interorganizational ties. The fact that the constraint of mandated relations was the best predictor of referral network centrality, but was negatively related to attributed influence, suggests that central organizations with low autonomy will have low status. It is usually assumed that network centrality is beneficial because it increases an actor's ability to influence resource transactions between network members. However, it has been argued that central actors are actually in the position of greatest dependence because they are vulnerable to excessive and conflicting expectations (Thompson and McKewn, 1958; Pondy, 1977). Constraints on the decision-making process breed internal frustration and dissatisfaction, and attributed influence is low because the organization is perceived as not controlling its own fate.

Third, these results underscore the robustness of the relationship of centrality to attributed influence that has previously been demonstrated at intraorganizational levels of analysis. It appears that the distinctive properties of interorganizational networks do not significantly interfere with this relationship. In this study, the most consistent predictors of referral network centrality and attributed influence were the number of joint programs and the extent of formal and informal communications.

Finally, the past emphasis on dyadic analysis of interorganizational relations clearly has limitations, since it ignores the fact that a relationship between any two organizations is strongly influenced by network context. This study suggests that information about network centrality will improve predictions of the form, stability, and usefulness of dyadic linkages between network members.

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APPENDIX: Measurement of Study Variables

Joint Programs. Persons interviewed were asked to list organizations with which they had jointly planned and implemented any specific programs or activities during the past three years.

Formal Communication. Persons interviewed were asked to list organizations from whom they regularly received newsletters, annual reports, or other information. The most central organization was the one whose formal communications were more widely received by other organizations.

Informal Communication. Persons interviewed were asked to indicate those organizations for which they had personally met with the administrative director during the last year to discuss the activities of their respective organizations.

Client Referral. Persons interviewed were asked to list organizations to which their organization commonly sent adult disadvantaged clients and to indicate the approximate number of clients sent to each organization. Referrals received was not measured, since most manpower programs have ample clients requesting services. The critical contingency was to get other organizations to accept clients as referrals.

Advisory Board. Persons interviewed were asked if their organization had a board of directors or advisory council.

Attributed Influence. Persons interviewed were asked to list organizations that were very influential in shaping community policies related to the provision of employment and training services to disadvantaged adults. The number of nominations received by each organization was counted.

Difficult Clients. This was measured through calls to regional, state, and federal administrators, as well as calls to all local agencies. The measure was the number of problems of the typical client served by an agency. A client with a single problem was assumed to be the least difficult to serve. Clients having two or three problems were viewed as moderately difficult. Clients with more than three problems were viewed as most difficult.

Ideological Conformity. Factor analysis of 12 interview items yielded three types of ideologies: (1) blaming the client, (2) blaming the environment, and (3) blaming the system. Items with loadings above .40 were weighted with factor weights, standardized, and summed to create the three scores.* The final measure was computed by taking the mean difference between each organization and each other organization in the network for each ideological score. These mean differences were then added together to serve as an overall measure of ideological conformity. The scale was inverted so that a larger value represented greater ideological conformity.

Geographic Proximity. These data were compiled by the interviewers. The following scale was employed to measure geographic proximity: 6=same office of building; 5=within two blocks; 4=same side of city (3–15 blocks); 3=across town; 2=different city, but same county; 1=in next county. A score for each organization was computed by calculating the organization's mean distance to all other organizations in the sample site.

External Administration. This was ascertained through telephone calls to federal, state, and regional administrators and calls to all local agencies. The measure was binary state or federally administered versus locally administered agencies.

Organization's Size. Two measures were used. Staff size was determined through the interviews. Extent of services was determined through review of agency documents and phone calls to local administrators. Fifteen distinct services were identified.

Mandated Linkages. These were determined from a review of federal and state legislation and calls to federal, state, and regional administrators. The measure included mandates resulting from court orders, as in the case of probation officers. The number of organizations mandated to work with each focal organization was computed.

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* Specific interview questions and factor analysis results available from the first author.

Interpersonal Ties. Persons interviewed were asked to list organizations for which they had ties with one or more members. They were asked to select among the following reasons: (1) grew up with the person; (2) attended the same college or similar institution; (3) had common membership in a fraternal organization; or (4) had previously worked in an organization with the other person. The first three items indicated informal ties, the fourth item indicated work ties.

Occupational Role Development: The Changing Determinants of Outcomes for the Individual

Barbara Ley Toffler

This research examined the development of an occupational role from one month before the role incumbent's graduation from training to five months into the first job. Kahn et al.'s (1964) theory of "expectation-generated role stress" provided a conceptual framework for the development of a causal model of role development. A national sample of 181 physicians' assistants (PAs) and their supervising physicians reported by questionnaire on actual and expected PA task performance and participation in decision making at three points during the period of interest. Task data were used to derive three measures of objective role ambiguity and conflict. In addition, PAs provided data on perceived role ambiguity and conflict and attitudes about work. A path analytic technique was applied to the model to examine changes over time. Results suggest that, during the first five months of employment, the role occupant passes through different stages of development, during which the determinants of outcomes change. This notion of changing causal structure was supported by the identification of four causal patterns of outcomes, the changing strength of prediction models, and the changing effects of discrepancies between pre-job expectation and on-the-job reality. Role-development stages are discussed in terms of rational and emotional processes, and implications for theory, research, and practice are proposed.•

When individuals enter organizations, the positions they fill are presumed by both the new employee and the employer to be clearly defined sets of activities and responsibilities. The applicant knew what he or she wanted to do and sought a place in which to do it, while the organization chose a person to meet its stated needs. The match, however, is often less than perfect. The unfortunate experiences of many individuals have been documented by research in both role theory and socialization (Kahn et al., 1964; French, 1974; Feldman, 1976). Typical reactions such as, "It's not the kind of job I thought it would be," or "He didn't turn out to be the right person for the job" are common post hoc rationalizations for an unsuccessful association. The explanation of these reactions is likely to be in terms of the faulty socialization of the employee and/or the effects of unrealistic expectations on the part of both parties. And, indeed, these explanations do capture a global truth.

In studying the complex relationship of expectation and experience in a new occupational role, this paper takes into account two other factors that affect the outcome of a new job for the individual. The first is that, within the constraints of specific organizational requirements, an occupational role is in reality created by the actual behaviors of the role occupant and the interaction of his or her role expectations with the expectations of other people within the organization. The second factor is that the elements that ultimately relate to a successful union act differently at different stages in the growth of the relationship. The process is developmental and requires step-by-step attention to the determinants of success in building the occupational relationship. This statement does not imply that one should disregard the future effects of present factors, but rather that the future effects of present factors can be under-

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stood and predicted only by understanding the effects of present factors on present outcomes.

The notion of interpersonal action in the socialization process was raised by Graen (1976), who proposed that one might look at the incorporation of an individual into an organization in two opposing ways. The first of these he defined as the Fixed Job Model, which assumes that the job, the organizational context, and the individual are all stable over time, that once a qualified job applicant has been identified, he or she can simply be placed into the work setting like a "new machine" and operate satisfactorily with only "periodic preventive maintenance" (Graen, Orris, and Johnson, 1973).

Citing numerous studies that demonstrated negative results from the Fixed Job Model, Graen (1976) proposed an alternative approach: the Interpersonal Role-Making Model. This model suggests that the effects of organizational and job demands on the assimilation of a new member will be modified by the interpersonal relationship between the new member, his supervisor and others in the organization.

The importance of attending to separate stages of role development was emphasized by Feldman (1973) in his contingency model of socialization. This model suggests that the activities of the role occupant vary at each stage of development, that progression through each of these stages depends on successful completion of the previous stage, and, most important to the study presented here, that the activities that affect outcomes for the individual are different at each stage of socialization.

These two critical factors suggest that the building of an organizational role must be studied from a developmental perspective that incorporates the interaction of the expectations of the person assuming the role and those of the people with whom he works as a causal variable, along with the other factors presumed to affect successful outcomes, and examines the way in which these factors affect the individual at different stages of early employment.

A FRAMEWORK FOR STUDYING THE ROLE-DEVELOPMENT PROCESS

If it is accepted that a key factor in the role-development process is the effect of interacting role expectations on outcomes for the individual, Kahn et al.'s (1964) theory of "expectation-generated role stress" can serve as a framework for developing a model of the process. Expectation-generated role stress has been defined as having two primary sources: role ambiguity and role conflict. Role ambiguity reflects a lack of clarity, an absence of communicated information about the expectations of the organization for task activity, responsibility, and behavioral norms associated with the role. Role conflict, on the other hand, assumes that the expectations of the organization have been communicated and received, but that these expectations are either incongruent with those of the role occupant or that the expectations of each one are mutually incompatible (Kahn et al., 1964; Graen, 1976; Van Sell, Brief, and Schuler, 1977).

Role ambiguity and role conflict are useful constructs for examining the role-development process in that they directly address the issue of interacting role expectations. Much of the research on expectation-generated role stress has used a correlational approach to identify the antecedents of role ambiguity and role conflict (Rizzo, House, and Lirtzman, 1970; Caplan and Jones, 1975; Walker, Churchill, and Ford, 1975; Miles and Perreault, 1976; Miles, 1976a) and the relationship of role ambiguity and conflict to outcome variables (French and Caplan, 1972; Miles and Petty, 1975; Keller, 1975; Miles, 1976b, 1976c, 1977). Most of this research has focused on ambiguity and conflict as subjective reports of role occupants. If one wishes to explore the role-development process as it has been described above, however, one must assess the real or objective presence of role ambiguity and conflict, both as antecedent to the perceptions of role ambiguity and conflict by the role occupant and as itself a determinant of outcomes for the role occupant. This requires gathering the role expectations of the incumbent and the role expectations held for the incumbent by one or more role senders and then measuring the amount of objective congruence or compatibility between them.

The role of physician's assistant offers good potential for the exploration of the role-development process. The PA role was established in 1966 for the purpose of extending physician services in medically underserved areas of the United States. The PA training programs developed as abbreviated versions of the medical school model, teaching basic diagnostic techniques and sophisticated technical procedures formerly performed by physicians. The social structure of the existing health care system, however, placed PAs at a level of autonomy and responsibility similar to that of nursing personnel. Although they may perform a variety of tasks requiring extensive knowledge and well-developed skills, they may do so, in theory at least, only at the direction and under the supervision of a physician.

The result of these divergent sets of role expectations has been a considerable amount of confusion as to what the PA role should be and how it should relate to and interact with the established medical roles of physician and nurse (Sadler, Sadler, and Bliss, 1975). Since there is no institutionalized concept of role for the PA and no guidelines have been established for role performance, sources of role expectations may be widely divergent. PAs base their expectations on information offered by their training programs as to what their roles ideally should be; physicians and nurses, on the other hand, are likely to base expectations on the needs of their particular practice setting. The potential for unclear or incongruent role expectations is evident, and research (Coye and Hansen, 1969; Breer, Nelson, and Bosson, 1974) has indicated that role ambiguity and conflict are all too common. The newness of the PA occupation, with its uncertainty as to role requirements, makes it an ideal subject for the study of the role-development process.

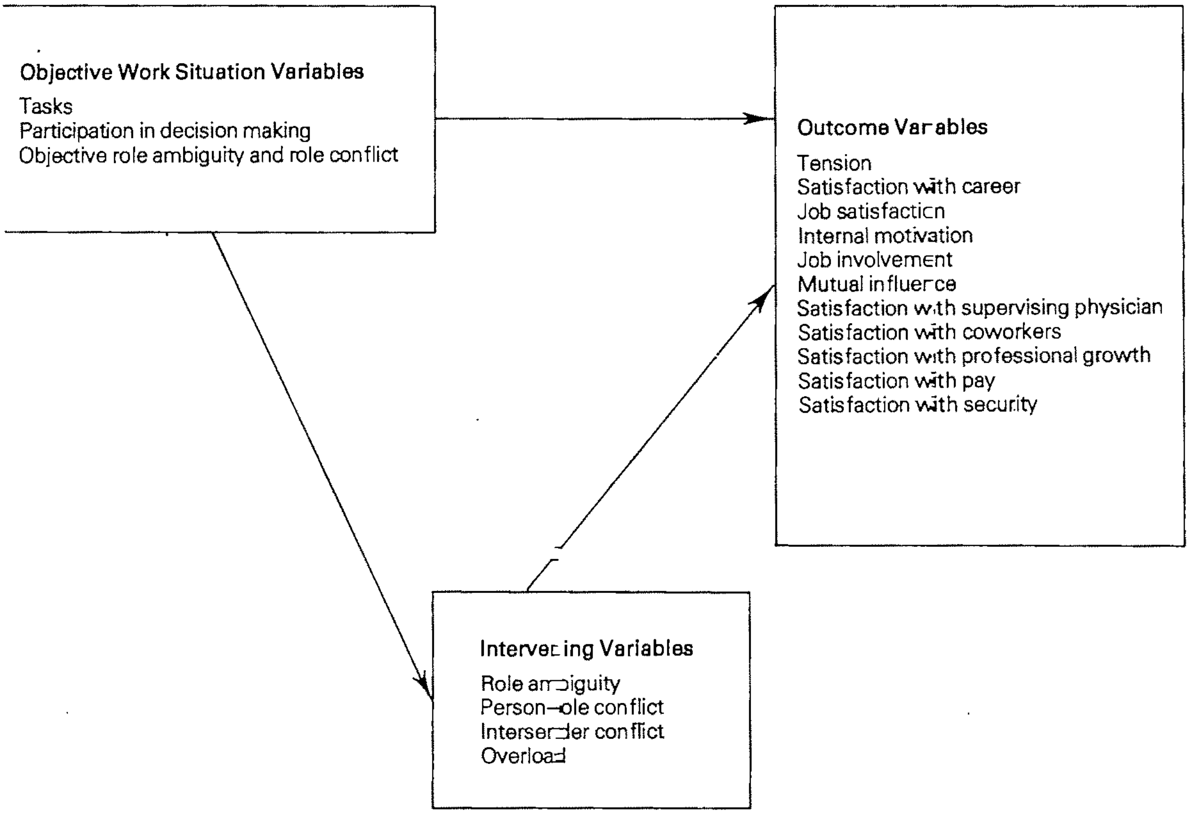
RESEARCH OBJECTIVES, STRATEGY, AND VARIABLES

The objective of this research was to investigate the development of the occupational role of the physician's assistant (PA) in his or her first post-training job. Two assumptions underlay the research strategy employed: (1) The making of a role is affected by the expectations of members of the employing organization who interact with the occupant of the focal role (i.e., the role set), as well as by the expectations and activities of the role occupant himself. (2) The role-development process is dynamic (Graen, 1976); it is initiated during the training period and continues to evolve after the trainee has entered the work setting.

For these reasons a longitudinal research strategy was developed, in which the data were collected by questionnaire at three points in time from the physician's assistant and the PA's supervising physician in the first work setting.

Figure 1 presents a model of the variables and the potential relationships among them that were studied at each point in time.

Figure 1. Model of role development variables and their relationships.


Objective Work Situation Variables
Tasks
Participation in decision making
Objective role ambiguity and role conflict
Outcome Variables
Tension
Satisfaction with career
Job satisfaction
Internal motivation
Job involvement
Mutual influence
Satisfaction with supervising physician
Satisfaction with coworkers
Satisfaction with professional growth
Satisfaction with pay
Satisfaction with security
Intervening Variables
Role ambiguity
Person–role conflict
Intersender conflict
Overload

METHOD

Subjects

The subjects for the study were physicians' assistants (PAs) who graduated from Primary Care Accredited Physician Assistant Programs from July through December 1976. A national sample of 181 PAs representing 26 PA training programs participated in the project. Seventy-six percent of the respondents were male and 24 percent were female, with an age range of from 21 to 46 and a mean age of 28.3 years.

The types of practice settings in which the PAs were employed after graduation were as follows: private practice (55 percent), hospitals (20 percent), health maintenance organizations (7 percent), rural or satellite clinics (7 percent), and other settings, such as correctional institutions, student health facilities, and the Alaska pipeline (9.9 percent).

In most settings, with the exception of some satellite clinics and the pipeline, the PA was responsible to an on-site physician, who designed and supervised the PA's activities. This primary role sender was identified by the PA after entering practice. Ninety-six percent of the physicians were male and 4 percent were female, with a mean age of 44.3 years and an age range of from 25 to 67 years.

Data Collection Schedule

Data were collected by questionnaire from PAs at three times: Time 1, one month before graduation from the training program; Time 2, four weeks after entry into the employing organization; and Time 3, five months after entry into the employing organization. Data from supervising physicians were gathered at Times 2 and 3. One potential problem with gathering longitudinal data for more than one respondent per focal individual is attrition, both over time and within the respondent set. This problem did occur in the study. To insure that the subject sample remained consistent for all analyses across time, only those PAs who responded at all three times and whose supervising physicians responded at Times 2 and 3 were included. However, for development of the attitude and satisfaction scales, all respondents at each time were used to provide a broad base for scale reliability. For clarity, the *N* for each analysis is presented.

Objective Work Situation Variables

PA tasks. PA tasks were drawn from a pilot study (Toffler, 1977), in which a list of 51 tasks was compiled from a medical task inventory. Task data were factor-analyzed, and representative tasks from each of nine clusters were chosen for inclusion in the present research; this procedure resulted in a list of 28 tasks.

Each respondent was asked to report which of the tasks he or she actually performed and which of the tasks he believed a PA in his practice setting ought to perform. (At Time 1, the PA was asked which tasks he expected to perform after employment.) The supervising physician was asked which tasks he or she believed a PA in his practice setting ought to perform.

To identify clusters of task activities, five separate principal-factor analyses were conducted on the following data: Time 1:

PAs' reports of tasks they expected to perform; Time 2: PAs' reports of tasks they actually performed and tasks they ought to perform; and Time 3: PAs' reports of tasks they actually performed and tasks they ought to perform. Six task clusters involving 6 tasks appeared consistently across the five sets of data. The clusters were labeled (1) general primary care, (2) invasive procedures, (3) referral activities, 4) lab procedures, (5) sexual counseling, and (6) supervisory activities. Task cluster scores were calculated by adding the values of all the responses within a cluster.

Of the 12 items that did not fall into clusters, three were selected as additional task components to be included in analyses because of author interest. These were psychological counseling, drug therapy outside standing orders, and clerical work.

Participation in decison making. In addition to considering the effects of specific task activities on outcomes, physicians' assistants interviewed before the study suggested that the amount of PA-reported participation in decision making was a critical task that should be included in the study. This suggestion was supported by the work of Alutto and Vredenburgh (1974) in their study of nursing personnel and role conflict. Therefore, participation in decision making was measured by a list of 11 items drawn from Alutto and Vredenburgh and from the PA interviews, which reflect a variety of decisions in which a PA might expect to have a voice (see Appendix A). Responses to these items were scored on a three-point scale (1 = not involved, 2 = consulted, 3 = participated fully), and an aggregate score was used in data analysis.

Objective role ambiguity and role conflict. From the list of task items representing role activities, three pieces of data were used to derive three measures of objective role conflict and role ambiguity: (1) the PA's report of those tasks actually performed, (2) the PA's report of those tasks he felt a PA ought to perform, and (3) the supervising physician's report of those tasks a PA ought to perform.

1. *Role dissensus* is the difference between what the PA feels he ought to do and what the supervising physician feels the PA ought to do. Role dissensus = (PA ought minus MD ought). This is simply a measure of conflict of expectations.

2. *Role noncompliance* is the difference between what the PA is actually doing and what the supervising physician feels the PA ought to do. Role noncompliance = (PA do minus MD ought). This measure has three possible interpretations: (a) it may represent a lack of clear communication between the MD and the PA (ambiguity), (b) it may be a measure of the PA's feelings of inadequacy in performing the expected role (role conflict), or (c) it may represent the MD's conflict between his avowed expectations and his actual behavior in regard to delegation of duties to the PA (Coye and Hansen, 1969).

3. *Personal conflict* is the measured difference, on the task items, between what the PA feels he ought to do and what the PA reports actually doing. Personal conflict = (PA ought minus PA do). This discrepancy represents an objective measure of person-role conflict. It can be thought of as the focal person's

feeling that his expectations of the role and the expectations held by others for the role are incompatible.

Because I was interested in the differences on the total amount of conflict and ambiguity in the work setting rather than the differences on particular task activities, the three measures were computed in the following way. For a particular variable, for example, role dissensus, the difference between the components (e.g., PA ought, physician ought) was taken on each task item. This resulted in a score of 0 (agreement) or +1 or –1 (disagreement). These scores were then aggregated to produce a single index for the variable of interest (e.g., role dissensus) for each PA.

The computation of objective conflict and ambiguity scores raised the question of whether discrepancies should be computed as absolute differences or directional differences. Theoretically, the question becomes: Is the amount of conflict or ambiguity in role expectations the predictor of outcomes for the individual, or is it the kind of conflict and ambiguity in expectations that produces effects? To test the differences in the relationship between absolute discrepancies and outcomes, both absolute and directional discrepancies were computed for each of the three objective conflict-ambiguity variables. Then each discrepancy was correlated with 11 outcome measures (six attitudes, five specific satisfactions). Sample results for two outcomes appear in Table 1.

As Table 1 indicates, absolute discrepancy scores were related to the outcomes of job satisfaction and satisfaction with professional growth. However, the relationship held only in a single direction for each type of discrepancy. These comparative correlations suggest that objective role ambiguity and

Table 1

Correlation of Absolute and Directional Discrepancy Scores with Sample Outcomes

Measures of role conflict	Job satisfaction	Satisfaction with professional growth
Dissensus		
Absolute Time 2	–.01	–.10
Positive Time 2	.00	–.07
Negative Time 2	.04	.05
Absolute Time 3	–.22•	–.31•••
Positive Time 3	–.26••	–.34•••
Negative Time 3	–.04	–.04
Noncompliance		
Absolute Time 2	–.14	–.16•
Positive Time 2	.10	.08
Negative Time 2	.22•	.22••
Absolute Time 3	–.21•	–.27••
Positive Time 3	–.09	–.10
Negative Time 3	.14	.20•
Personal Conflict		
Absolute Time 2	–.19•	–.29••
Positive Time 2	–.20•	–.30•••
Negative Time 2	.00	.06
Absolute Time 3	–.39•••	–.35•••
Positive Time 3	–.39•••	–.41•••
Negative Time 3	.10	–.10

•p <.05, ••p <.01, •••p <.001

conflict must be defined and measured according to their content, that the particular positions taken by the role occupant and the role sender within a conflictual or ambiguous situation are key issues in determining outcomes.

Based on this analysis, the three measures of objective conflict and ambiguity used in this study were positive role dissensus, negative role noncompliance, and positive personal conflict. Positive role dissensus indicates that the PA believed that he ought to be doing more than the MD believed the PA ought to do. Negative role noncompliance suggests that the PA was doing less than the MD believed the PA ought to do. Positive personal conflict indicates that the PA believed he ought to be doing more than he, in reality, was doing. Taken in concert, these three discrepancies suggest that the PA wants to do and feels adequately trained to perform more than the present situation allows and that the issue of noncompliance reflects either ambiguity in communication from MD to PA (item a, above, under Role noncompliance) or personal conflict within the MD (item c).

Intervening Variables

Attitudes hypothesized to be intervening states were measured on seven-point Likert-type scales detailed in Toffler (1978). The four intervening variables were role ambiguity, person-role conflict, intersender conflict, and overload. The scales for measuring these variables were adapted by the author from scales developed by House and Rizzo (1972).

Outcome Variables

Attitudes hypothesized to be outcomes for the PA were also measured on seven-point Likert-type scales on 11 dimensions; six of these scales addressed general work-related attitudes: (1) tension, (2) satisfaction with career, (3) job satisfaction, (4) internal motivation, (5) job involvement, and (6) mutual influence. Items for the tension scale were drawn from Miles and Petty (1975). The satisfaction-with-career scale contained items from the Hackman and Oldham (1975) Job Diagnostic Survey but was expanded with additional items written by the author. Job satisfaction and internal motivation items were drawn from Hackman and Oldham (1975), job involvement items from Lodahl and Kejner (1965), and mutual influence items from Feldman (1976). The remaining five scales focused on specific satisfactions: satisfaction with (1) supervising physician, (2) coworkers, (3) professional growth, (4) pay, and (5) security. These scales were adapted from Hackman and Oldham (1975). Internal consistency reliabilities for intervening and outcome variables showed a range of from .50 to .91, with a median of .75 and with an average across-time difference of .04. The single exception was the internal motivation scale, which showed a reliability difference of .17.

Analytic Procedure

Two kinds of analysis were necessary to obtain complete results from the data. First, the variables for the objective work situation, the intervening variables, and the outcome variables at each time were correlated to demonstrate the presence of significant relationships between them. This analysis replicated the primary methodology employed in the role-stress studies cited earlier. A second analytic procedure was then needed to investigate the cause-effect nature of these variable relationships within each time period and to compare those causal patterns across time. Path analysis was used to examine cross-sectional causal patterns. In path analysis, structural models are defined by a set of equations in which the value of the specified variable can be predicted, given the values of other variables (Heise, 1970). Through this process, two kinds of causal effects can be identified: (1) the direct effects of a group of variable factors on an ultimate variable, and (2) the indirect effects of a group of variable factors on an ultimate variable through one or more intermediate variables.

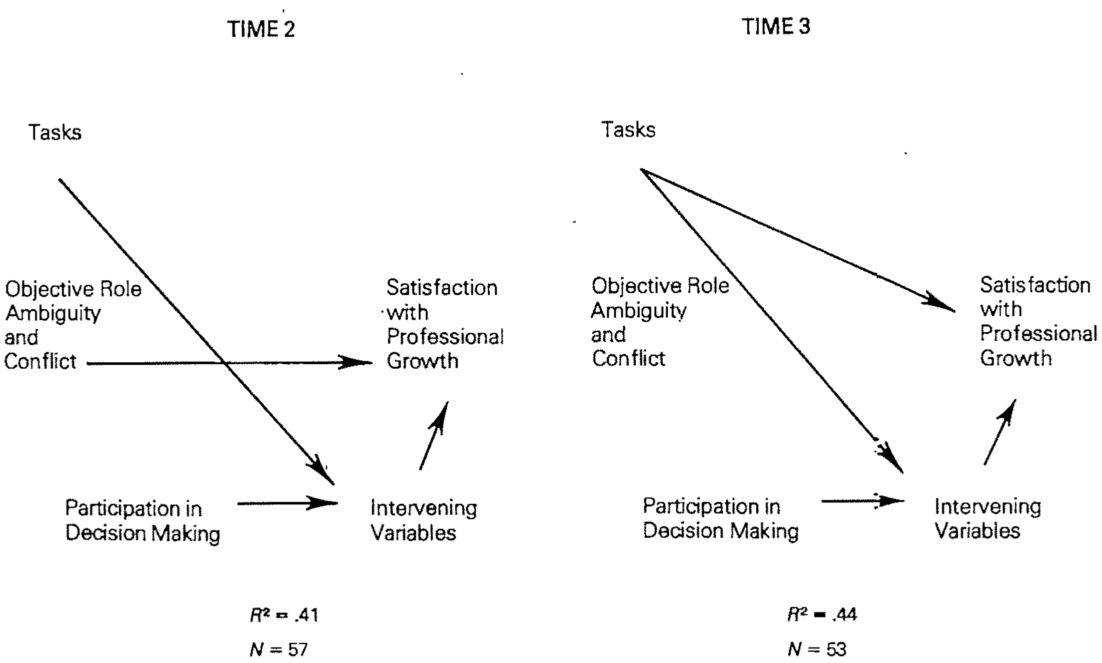
In the causal analysis, a four-step procedure, using successive models, was followed to demonstrate the effects of variables on outcomes. This led to identification of patterns of changing causal structure. Causal analyses focus on Times 2 and 3, the two post-job entry time periods, to examine the developmental process on the job. Time 1 will enter the picture later to explain the effects of pre-job expectations on that process.

Step 1. A full model was specified, which included (a) the objective work situation composed of nine task activities, the three measures of objective role ambiguity and role conflict, and participation in decision making, (b) the four intervening variables, and (c) the 11 outcome measures. Multiple regression was run with each of the intervening variables and each of the outcome variables at Times 2 and 3 to generate path coefficients. All coefficients not significant at $p = .05$ were dropped from the models, and the models were re-estimated.[1]

Step 2. Although the path analysis required the incorporation of 13 objective variables, the primary concern in this research was with the three general components of the objective work situation: tasks, objective role ambiguity and role conflict, and participation in decision making. Similarly, the focus of the perceptions of role ambiguity and conflict was on the total picture of the intervening variables rather than on four separate variables. To adhere to this view of the variables, a condensed model was constructed for each outcome. The condensed models do not focus on the individual path coefficients, but rather on the causal paths that exist among the variable sets. The models were derived by the following procedure: after the path analysis was run using the 13 objective variables, the nine task clusters were examined to determine if a path with a significant coefficient originated from one or more clusters. If a significant path from one or more task clusters did appear, the condensed model showed a path originating from the component task. Similarly, the three measures of objective role ambiguity and conflict were examined for significant paths; if a significant path from one or more measures appeared, the condensed model showed a path originating from the component objective role ambiguity and conflict. A similar rule was applied to the four intervening variables, yielding a path from intervening variables in the condensed model if any of the four measures showed a significant path. The statistic of importance in evaluating these models was the R^2, the amount of variance in predictive ability accounted for by the model. As an example, Figure 2 presents the condensed model for a single outcome, satisfaction with professional growth.

[1] Re-estimated path coefficients for each outcome with objective and intervening variables and each intervening variable with objective variables are detailed in Toffler (1978).

Figure 2. Condensed causal models for satisfaction with professional growth.


TIME 2
Tasks
Objective Role Ambiguity and Conflict
Satisfaction with Professional Growth
Participation in Decision Making
Intervening Variables
$R^2 = .41$
$N = 57$
TIME 3
Tasks
Objective Role Ambiguity and Conflict
Satisfaction with Professional Growth
Participation in Decision Making
Intervening Variables
$R^2 = .44$
$N = 53$

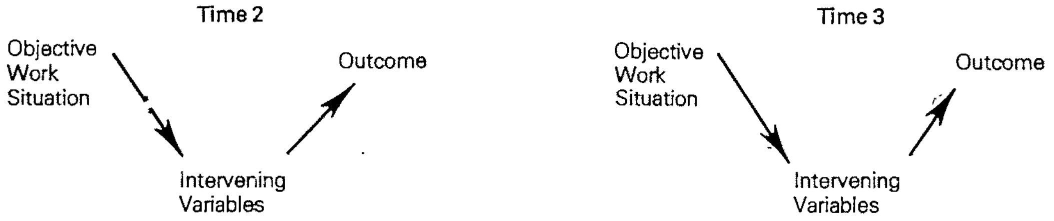
Step 3. Although the construction of a condensed model serves to demonstrate the hypothesized causal ordering of the classes of variables, it does not provide the means to understand which of those variable classes or their components is actually accounting for the greatest amount of variance. To determine this, changes in R^2 were measured after removing from the model the component of the prediction equation (one of the three objective components or the set of intervening variables) whose contribution to the amount of variance was being studied.

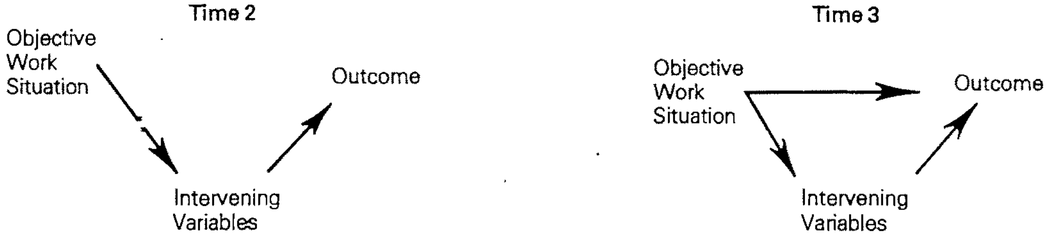
This analysis allowed further condensation of the model to highlight the primary predictive component of each outcome at each time. For example, for the sample outcome in Figure 2, at Time 2 the intervening variables accounted for the greatest amount of variance in the outcome ($\Delta R^2 = .21$), whereas at Time 3, tasks accounted for the greatest amount of variance in the outcome ($\Delta R^2 = .27$). Therefore, the final model reflected only these paths.

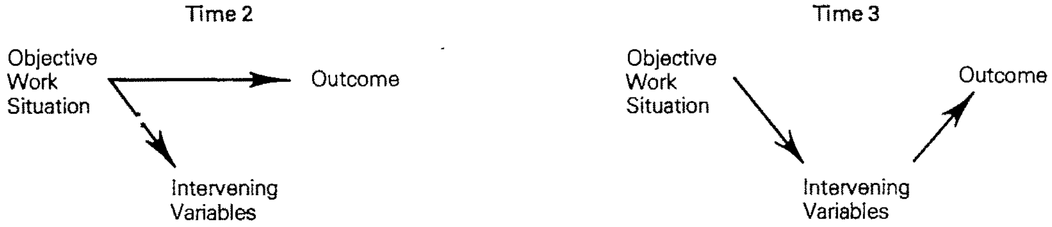
Step 4. The three components of the objective work situation were collapsed into a single unit: if any of the three components (task, objective role ambiguity and conflict, and participation in decision making) appeared as a predictor, the model showed a path emanating from the category "objective work situation." Each outcome variable and its predictors at Times 2 and 3 were modeled and compared.

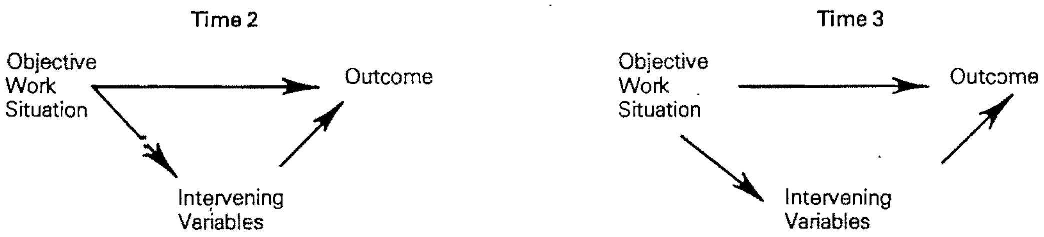
From this analysis four patterns of changing causal structure were identified, with each outcome variable located in a single pattern. The four change patterns are: (1) Maintained Internal Effect (MIE), (2) Emerging External Effect (EEE), (3) Emerging

Figure 3. Patterns of changing causal structure.


Maintained Internal Effect Pattern


Emerging External Effect Pattern


Emerging Internal Effect Pattern


Maintained Dual Effect Pattern

Internal Effect (EIE), and (4) Maintained Dual Effect (MDE). They are shown in Figure 3.

Outcome variables that follow the MIE pattern show a consistent causal structure over time. For these variables the objective work situation has no direct effect on the outcome but indirectly affects it through the intervening variables.

EEE pattern outcome variables demonstrate a change in causal structure over time. At Time 2 these outcomes are not directly affected by the objective work situation. However, at Time 3 the structure changes so that the objective work situation becomes a direct predictor of outcomes, and the effects of the internal state have become minimal.

Outcome variables that follow the EIE pattern also show a change in causal structure over time, but this pattern is directly opposite to the EEE pattern. The objective work situation is a direct predictor early in the role-development process. But by five months, they show the internal pattern of indirect effects of the objective situation through the intervening variables.

MDE pattern outcomes demonstrate a consistent causal structure over time. This structural model includes all possible paths; the objective work situation is a causal agent, both directly to outcomes and indirectly through individual perceptions.

Expectation-Reality Discrepancies

The analytic procedures discussed up to this point address the role-development process as it occurs after the role incumbent has entered the work setting. However, the incumbent's expectations before he has physically assumed the role also play their part in the developmental process, in that the actual on-the-job role will either conform to those expectations or be discrepant with them.

When an individual develops expectations about a future role, he thinks in terms of two sets of behaviors: those behaviors that he will perform and those behaviors that he will not perform. By doing this, he lays the groundwork for two kinds of discrepancies: unfulfilled expectations for certain behaviors he had expected to perform but is not performing, and unexpected performance for certain behaviors he is engaged in that he had not expected to perform. We must differentiate between these two kinds of discrepancies to understand how each behaves in a causal relationship with outcomes. The components of the objective work situation used to compute these two discrepancies were tasks and participation in decision making. The four discrepancies of interest, then, were (1) unfulfilled task expectations, (2) unexpected task performance, (3) unfulfilled expectations about participation in decision making, and (4) unexpected performance of participation in decision making.

Two sets of time differences were of interest for the causal effects of discrepant expectations. The first was the difference between pre-job expectations and the actual situation four weeks into the job (Times 1 and 2 in this study) and the effects of those discrepancies on Time 2 outcomes. The second was the difference between pre-job expectations and the actual situation five months into the job (Times 1 and 3 in this study) and the effects of those discrepancies on Time 3 outcomes.

To assess the effects of discrepant expectations on outcomes at each time, multiple regression analysis was employed. Each outcome at a given time was regressed on the task discrepancies and the participation-in-decison-making discrepancies described above. For the conduct of the analysis, individual task clusters were employed. Since there were nine task clusters, 18 task discrepancies were used as possible predictors. (Unfulfilled-expectation discrepancy for each cluster and unexpected-performance discrepancy for each cluster.) In keeping with the focus previously drawn, however, the appearance of any task cluster discrepancy as a predictor in a regression model was reported simply as "Task." Appendix B presents the specific predictors for each outcome with their regression coefficients. All regression coefficients not significant at $p = .05$ were dropped from the model and the model re-estimated until a small set of significant predictors for each outcome was determined. The statistic of importance was R^2, the amount of variance in predictability accounted for by the model.

RESULTS

Correlational Analysis

The results of the correlational analysis indicate that some significant relationships did exist among the variables specified in Figure 1, although significant relationships were not demonstrated for each pair of variables. There were, however, two critical findings. First, the significant correlates within each pair of variable sets, that is, objective work situation with intervening variables, objective work situation with outcomes, and intervening variables with outcomes, differed from one time to another. For example, person-role conflict (intervening variable) was not significantly related to satisfaction with career (outcome) at Times 1 and 3, but the two variables were inversely related ($r = -.27$, $p < .01$) at Time 2; role noncompliance (objective variable) was directly related to satisfaction with professional growth (outcome) at Time 2 ($r = .27$, $p < .01$), but the two variables showed no significant relationship at Time 3. The second finding, as shown in Table 2, was that the greatest number of significant correlates for each pair of variable sets occurred at Time 3 and that these relationships were stronger than those occurring earlier in the employment period.

These results suggest that during the first five months in a job, an occupational role incumbent is passing through stages in the development of his role. The variables that relate to outcomes for him at one time may be different from those that relate to outcomes at a later time. It may indicate, as well, that the stages of role development evident during the first five months of employment are building the relationship structures that will eventually become stable for the particular role. A third wave of post-employment data would have clarified this hypothesis. If a common set of significant correlates could have been demonstrated between Time 3 and a later date, the notion of emerging and eventually stabilized variable relationships would have been supported.

Table 2

Number of Significant Correlations for Each Pair of Variable Sets for Three Data Collection Times

Pairs of variable sets	Time 1	Time 2	Time 3
Objective work situation with intervening variables	3	1	6
Objective work situation with outcomes	2	12	25
Intervening variables with outcomes	2	14	20

Causal Analysis

Maintained internal effect. The outcomes that fell into this pattern were tension, job involvement, mutual influence and satisfaction with supervision. For these outcomes, it appears that what is occurring in the work situation only matters in the way that it affects the individual's perceptions of ambiguity and conflict.

It is not surprising to find these four outcomes directly predicted by perceptions of role ambiguity and conflict across time. These outcomes are similar to some of the traditional measures of role stress that have been employed in research on the consequences of subjective role ambiguity and conflict. These findings support the notion that the outcomes of tension, mutual influence, and satisfaction with supervisor are, in fact, "feeling"-dominated across time. The grouping of these outcomes was further supported by PAs' responses to open-ended questions on the research instruments. As one respondent employed in a private practice setting succinctly stated, "The lack of feedback and . . . supervison makes it a little nerve-wracking."

Job involvement, although not previously employed as a measure of role stress, appeared to fit into the MIE pattern. This finding suggests that involvement in the work is a function of the way an individual feels about his job, rather than of the activities that he actually performs. The MIE pattern outcomes appear to be measures of emotional role stress, for which subjective measures of role ambiguity and conflict continue to be the best predictors.

Although the MIE pattern indicates that the causal structure of the four outcome variables cited does not change over time, the R^2s for the prediction model of each outcome at each time will show whether the strength of the relationship changed. Table 3 shows that the models for tension and job involvement demonstrated stable predictive relationships across time. The models for mutual influence and satisfaction with supervisor showed a great increase in predictive ability over the four-month period between Time 2 and Time 3. Since both of these outcomes involve others in the work setting, it is apparent that they were better predicted after interpersonal relationships had had a chance to develop.

Table 3

R^2s for Variables in the MIE, EEE, and EIE Change Patterns

Outcome variables	Time 2	Time 3
Maintained Internal Effect		
Tension	.47	.47
Job involvement	.32	.29
Mutual influence	.18	.53
Satisfaction with supervisor	.34	.56
Emerging External Effect		
Job satisfaction	.38	.43
Satisfaction with security	.29	.32
Satisfaction with career	.35	.26
Satisfaction with professional growth	.4	.44
Emerging Internal Effect		
Satisfaction with coworkers	.2	.43
Satisfaction with pay	.14	.21

Emerging external effect. The outcomes that fell into this pattern were satisfaction with career, job satisfaction, satisfaction with professional growth, and satisfaction with security. Early in the role-development process, these outcomes were determined by the way in which the role occupant perceived his job. But by five months into the developmental process, the actual work situation determined whether the individual was satisfied with outcomes. (As the path from objective to intervening variables indicates, the individual's feelings may still vary with the objective work situation, but these feelings are not the elements explaining the variance in outcomes.)

The rationale underlying the grouping of these four outcomes in the EEE pattern is not readily apparent. Two of the outcomes, job satisfaction, and satisfaction with security, are, like the MIE outcomes, among the consequences cited in research on role stress. However, the evidence of their changing causal structure suggests that these variables might not be good measures of emotional role stress (although studying them at a single time could mask that fact). It appears that early in the job tenure these outcomes are the result of internalized experiences and, thus, might be considered emotional role stress, but by five months into the job they are more the result of an assessment of the real work situation and might thus be considered to be measures of rational role stress. Although the individual feels discomfort with the job, he is able to assess his situation and recognize that he has the ability to change it.

The four EEE outcome variables fall into two "rational" categories: job-related change which includes job satisfaction and satisfaction with security, and career-related change which comprises satisfaction with career and satisfaction with professional growth. Although satisfaction with security is traditionally thought of as an individual's feelings that his position in the organization is secure, it is very possible that during the early months of employment, satisfaction with security may be related to his inclination to leave the organization. During the first six months of employment, the individual may view security as his, not the organization's, choice. In this case, the level of job satisfaction and satisfaction with security may both become determinants of a job-change choice. This notion is supported by a respondent in a private practice setting, who stated (at four weeks into the job), "I think my employer is satisfied with my performance. However, I am not . . . fulfilling the role as PA . . . set by the (training) program in this present job." Four months later this PA reported, "I have found another job."

Similarly, the level of satisfaction with career and with professional growth may both become determinants of a career-change choice. Responses to open-ended questions indicated that many PAs were considering changing careers by applying to medical school. In every case the reasons given were related to a desire for growth: "I feel that the job is not as academic as I would like"; "The demands on my time do not permit me to keep up with continuing education"; or "I could do much more for them (patients) as an M.D."

Table 3 indicates that the strength of the predictive relationship for EEE variables was relatively stable over time. The model for satisfaction with career was the only one that decreased, whereas the prediction models for the other three variables showed a slight increase in strength over the four-month period between Times 2 and 3.

Emerging internal effect. The outcomes that fell into the EIE pattern were satisfaction with coworkers and satisfaction with pay. For these two outcomes, the reality of the work situation was the causal agent early on, but as the role became more established, the individual's perceptions of that reality became primary in the causal chain.

The grouping of these two outcomes suggests that satisfaction with coworkers may reflect feelings of equity or social comparison by the individual. This finding may be idiosyncratic to the particular subject population of this study. Since PAs tend to perform physician-like tasks while being placed in a nursing-like role in the medical status hierarchy, it may be that the PAs' feelings about coworkers, usually nurses, are determined by pay comparisons with the coworkers and by perceived fairness of pay for type of work performed.

Data from respondents strongly supported this notion. One PA, employed in a student health center, cited his "only" problem as being "that I am compared with our nurses when it comes to . . . benefits, but when it comes to work I am compared to our residents and my supervising physician." His sentiments were echoed by PAs in private practice, hospitals, and military settings.

The EIE pattern, external to internal causality, suggests that early in the job tenure comparisons are based on an assessment of the actual work situation. These assessments would then seem to be internalized over time so that, by five months into the job, it is the feelings resulting from those early assessments that affect the outcomes of satisfaction with coworkers and pay. EIE outcomes can, therefore, be considered social comparison outcomes.

As Table 3 indicates, the strength of the predictive relationships for EIE outcomes increased over time, suggesting that satisfaction with coworkers and pay are better predicted after the effects of the actual work situation have been internalized.

Maintained dual effect. A single outcome, internal motivation, fell into this pattern, indicating that the individual is motivated by the intrinsic rewards of his or her work. It seems logical, therefore, that this outcome is affected at both times by both the actual work situation and the individual's feelings about it.

The strength of the predictive relationship for the internal motivation model was relatively stable over time. At Time 2, $R^2 = .27$, and at Time 3, $R^2 = .23$. The internal motivation model appeared to be stable across time in both its causal structure and predictive strength.

Effects of discrepant expectations on outcomes. Table 4 presents the results of the analysis of the effects of discrepant expectations on outcome. A model with an R^2 of .25 or above was considered a good set of predictors. As Table 4 indicates, all but three outcomes can be predicted by expectation-reality discrepancies, at least at one time.

It appears that most outcomes were predicted by unfulfilled expectations, that is, that outcomes for individuals were af-

Table 4

Discrepant Expectations in Tasks and Participation in Decision Making as Predictors of Outcomes at Times 2 and 3

	TIME 2				TIME 3			
	Unfulfilled expectation		Unexpected performance		Unfulfilled expectation		Unexpected performance	
Outcomes	Predictor	R^2	Predictor	R^2	Predictor	R^2	Predictor	R^2
MIE								
Tension	Task	.20	Task	.37	PDM	.11	Task	(.28)
Job involvement	Task	.10			Task	.33		
Mutual influence	Task	.12	Task/PDM	.21	Task/PDM	.29		
Satisfaction with supervisor	Task	.51			Task/PDM	(.45)	Task	.16
EEE								
Satisfaction with career					Task	.16		
Job satisfaction	Task	.49			Task/PDM	.45		
Satisfaction with professional growth	Task	.64			Task	.72		
Satisfaction with security	Task	.19						
EIE								
Satisfaction with coworkers								
Satisfaction with pay			Task	.23	Task	.28		
MDE								
Internal motivation	Task/PDM	.23			Task	.31		

fected by their not doing what they thought they would be doing. Tension at Times 2 and 3 and satisfaction with pay (weakly predicted) at Time 2 were the only outcomes affected by unexpected performance. This finding suggests that an individual experiences increased tension when he performs tasks for which he feels ill-trained. Alternatively, the individual may believe he is performing tasks that should not be part of the job, and thus, his tension may be a manifestation of anger at his unexpected role. This second interpretation would also serve to explain the finding for satisfaction with pay, in that pay may seem inappropriate to this unanticipated role.

Task discrepancies appeared to affect outcomes at both Times 2 and 3. Participation-in-decision-making discrepancies appeared to be active primarily at Time 3. The lag in this effect may reflect the individual's rationalizing at four weeks that he is still too new to the job to participate in decision making. However, by five months into employment, that rationale begins to wear thin.

Table 4 also allows examination of the predictive ability of expectation-reality discrepancies within the four causal structure patterns. For the two maintained effect patterns (MIE and MDE), the predictive ability of expectation discrepancies increased over time; for the Emerging External Effect pattern, the predictive ability of expectation discrepancies remained stable over time. For the Emerging Internal Effect pattern, the predictive strength of expectation discrepancies was relatively stable, with a slight increase evident at Time 3; however, the type of discrepancy that acted as a predictor changed over time. It appears that all patterns that demonstrated internal effect at Time 3 showed change of some kind in the predictive ability of expectation-reality discrepancies. These patterns were MIE, the emotional stress outcomes; EIE, the social comparison outcomes; and MDE, the single intrinsic motivation outcome. The one pattern in which there were only external effects at Time 3 was the EEE pattern, rational role stress. For these rational role stress outcomes, the predictive ability of expectation-reality discrepancies did not change over time.

Since we do not have data on the causal structure of outcome variables or the predictive ability of discrepancies during the time between four weeks and five months into the job, it is difficult, and perhaps capricious, to suggest reasons for the different types of interplay between the two sets of changes. Nonetheless, one may speculate about what is occurring in the role-development process. It appears that, during the time in which an outcome is predicted directly by the internalized perceptions of the role occupant, the effects of expectation-reality discrepancies are in a state of flux subject to the emotional state of the individual. Once the role occupant has passed through the stage at which outcomes are affected by his perceptions and has arrived at the stage at which reality determines outcomes for him, the effects of expectation-reality discrepancies become fixed.

Thus, the occupational role-development process may be viewed as having emotional and rational stages. Since we do not have data from any time after five months into the job, it is impossible to know if the internally determined outcomes move into a rational stage or, for that matter, if the "rationally" predicted outcomes return to an emotional stage. We can employ these two concepts, however, to integrate the results that have been presented.

DISCUSSION

The results of this research suggest that during the first five months of employment, the role occupant passes through different stages of development, during which the determinants of significant outcomes change. There are three ways to look at the changing causal structure.

1. *The four patterns of outcomes.* Examination of the causal models for each of the 11 outcomes at both four weeks and five months into the job indicates that there are four distinct patterns of outcomes for the individual. Two conclusions can be drawn from this finding. First, during the role-development process the causal determinants (i.e., internal or external determinants) of some outcomes differ at different times. One cannot merely say that job satisfaction, job involvement, reduced tension, and any number of other positive outcomes are all "good things" and, therefore, can all be achieved by the same process. Second, contrary to our broad statement that causality changes over time, it is apparent that for some outcomes the causal determinants are stable. This finding suggests that one must examine outcomes not only from the point of view of their different determinants, but also with an eye to whether or not a change in determinants occurs over time.

2. *The changing strength of prediction models.* A second way to look at changes in causality over time is to compare the predictive strength of the models for each outcome at four weeks and at five months into the job. It was noted that models of outcomes within a single pattern often displayed variations in predictive strength. The outcomes with stable predictors were tension, job involvement, job satisfaction, satisfaction with security, satisfaction with career, satisfaction with professional

growth, and internal motivation. The outcomes with models that increased in predictive strength over time were satisfaction with supervisor, satisfaction with coworkers, mutual influence, and satisfaction with pay. Here we see two distinct groups. For outcomes that depend heavily on others in the work setting (outcomes dealing with supervisor, coworkers, pay, and mutual influence), the predictive model became stronger after sufficient time had elapsed for relationships, and feelings about those relationships, to have developed.

3. *The changing effects of expectation-reality discrepancies.* The third way to demonstrate changing causality over time is by observing the different ways in which expectation-reality discrepancies affect outcomes at four weeks and at five months into the job. Unmet expectations affected the way individuals felt about their work situation both at an early and a later time in the job tenure. However, the kind of expectation-reality discrepancy (unfilled expectations or unexpected performance), the content of the discrepancy (tasks or participation in decision making), and the predictive strength of the discrepancy differed at the two times. The results suggest that, during the time at which an outcome is directly predicted by the internalized perceptions of the role occupant, the effects of expectation-reality discrepancies are in a state of flux and that these effects become stable only when the role occupant has arrived at a stage at which reality is the determinant of outcomes.

It is clear that during the first five months of employment an occupational role undergoes a variety of changes. The role is not a clearly defined entity but is, rather, a creation developed by the changing effects of actual work activities, differences in expectations between the role occupant and his role senders, discrepancies between the expectations of the role occupant and the reality he encounters, and the role occupant's perceptions of his employment situation. These findings have implications for theory, research, and practice.

Theoretical Implications

This research has three important theoretical implications. The first deals with the nature of roles. It is important that role theory include the notions of multiple and changing role determinants and, thus, the changing, fluid nature of roles themselves. The second implication is that organizational socialization can be thought of as a role-development process wherein the job incumbent and the organization interact to create a specific role within the requirements of the organization and the job. The third implication is for the theory of expectation-generated role stress, which has focused on the antecedents and outcomes of perceived role ambiguity and conflict. The theory must be expanded to include the conditions under which perceptions of ambiguity and conflict will develop and the conditions under which they will result in unsatisfactory outcomes.

Implications for Research

The findings of this study suggest three areas for further research. The first is the need for longitudinal studies that are both intensive, with data gathered at frequent intervals, and extensive, with data gathered over a long time. The present study leaves unanswered questions about the role-development process between four weeks and five months into the job. Similarly, although hypotheses have been made about the possible "emerging stability" of causal structures, with no post-five-month data, the issue of stability remains in the realm of speculation.

The second implication focuses on the need to conceptualize and operationalize the variables of importance in the role-development process. For example, the minimal correlational and predictive relationship between objective and perceived ambiguity and conflict suggests two possible interpretations: (1) that there may be a lack of construct validity requiring further investigation of what role ambiguity and conflict actually are or (2) that perceptions of ambiguity and conflict are not a function of measurable reality but result from other elements in the environment and/or personal predispositions. In either case, it is imperative that new ways of thinking about and measuring both objective and perceived role ambiguity and conflict be explored.

Finally, role-development research must be conducted in which data from multiple role senders are employed.

Implications for Practice

The themes of emotional and rational role stress, which emerged in the identification of the four change patterns, may have important implications for both individuals and the organizations that employ them. The concepts of rationality and emotionality were discussed primarily in terms of specific outcomes that are salient for an individual during the development of an occupational role.[2] There is, however, an alternative view. The stages, rather than the outcomes, of the developmental process may be emotional or rational, and for different outcomes the stages may be ordered differently over time. The present study does not provide sufficient data to investigate the issue fully. If, in fact, there are emotional and rational stages of role development, the implications for individuals for future career development are clear. It is essential that role occupants be aware that the "outcomes" they are experiencing may be the result of either the actual job situation or of their own feelings of ambiguity and conflict about their roles, which may be affected by a variety of factors. The danger for an individual lies in his taking action irrationally and choosing, for instance, to change his job or career when his dissatisfaction is based, not on the reality of his situation, but on his own feelings. It may be necessary for both individuals and organizations to develop different sets of coping mechanisms to match the developmental stage.

The results of this study have other implications for both individuals and organizations about the clarity of pre-employment role expectations and the design of socialization, or role-development, programs. What is most clearly apparent from this research is that the first five months in the development of an occupational role may be crucial in determining future job and career decisions for the individual. Although it is clear that at certain points in the developmental process wise decisions about career and job can be made, it is equally evident that a valuable person may be lost to an organization or, more unfortunately, to an occupation because of a poor understanding of the occupational role-development process.

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[2] A caveat may be necessary at this point. This study has employed a limited set of perceptual measures. Therefore, although we may discuss the "rational stage" as one in which feelings are no longer active, it is possible that feelings other than those measured in this research still affect outcomes for the individual. Until other variables important in the role-development process are identified and tested, a discussion of rationality and emotionality remains in a nascent state.

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APPENDIX A: Questionnaire Items on Participation in Decision Making

1. Decisions about which tasks I perform.
2. Decisions about who gives me supervision.
3. Decisions about planning total patient care.
4. Decisions about salary and promotions.
5. Decisions about planning the activities of other members of my medical team.
6. Decisions about the amount of supervision I require.
7. Decisions about how my role is explained to patients.
8. Decisions about how my time at work is spent.
9. Decisions about the kind of feedback on my clinical performance that I receive
10. Decisions about how my role is explained to other personnel.
11. Decisions about organizational policies concerning the use of PAs within the organization.

APPENDIX B: Regression Coefficients for Expectation-Reality Discrepancy Predictors of Outcome Variables

Table 4 gives the R^2s for prediction models for each of the outcome variables. The models consist of two categories, tasks and participation in decision making. This appendix shows the specific items that are active in the task category for each outcome, with the regression coefficients for those items and for participation in decision making.

TIME 2

		Regression coefficients	
Outcome	Predictor	Unfulfilled expectation	Unexpected performance
Tension	Participation in decision making	.330	—
	General primary care	—	1.063
	Laboratory procedures	—	–.460
	Sexual counseling	—	–.970
Satisfaction with career	Supervisory activities	.340	—
Job satisfaction	Participation in decision making	–.364	—
	Psychological counseling	–.545	—
Internal motivation	Referral activities	–.587	—
	Laboratory procedures	.419	—
	Prescription of drugs	.327	—
	Clerical work	.325	—
	Sexual counseling	—	.365
Job involvement	General primary care	–.377	—
	Invasive procedures	.452	—
	Sexual counseling	–.282	—
Mutual influence	Participation in decision making	–.377	—
	Psychological counseling	–.373	—
Satisfaction with supervisor	Participation in decision making	–.255	—
	Invasive procedures	.350	—
	Psychological counseling	–.483	—
	Sexual counseling	—	.401
Satisfaction with coworkers	Supervisory activities	—	.471
Satisfaction with professional growth	General primary care	–.219	—
	Invasive procedures	.188	—
	Psychological counseling	–.705	—
Satisfaction with pay	Laboratory procedures	–.284	—
	Supervisory activities	.434	—
	TIME 3		
Tension	Referral activities	.447	—
	Sexual counseling	—	–.423
	Prescription of drugs	—	.373
Job satisfaction	Psychological counseling	–.701	—
Internal motivation	Participation in decision making	.339	—
	Referral activities	–.264	—
	Laboratory procedures	–.295	—
Job involvement	Invasive procedures	.317	—
Mutual influence	Psychological counseling	–.343	—
	Participation in decision making	—	–.348
	Prescription of drugs	—	–.332
Satisfaction with supervisor	General primary care	–.507	—
	Invasive procedures	.575	—
	Referral activities	–.353	—
Satisfaction with professional growth	Invasive procedures	.220	—
	Prescription of drugs	–.232	—
	Psychological counseling	–.656	—
Satisfaction with pay	Laboratory procedures	—	.323
	Prescription of drugs	—	.431
Satisfaction with security	Laboratory procedures	.440	—

The Process of Bureaucratization in the U.S. State Department and the Vesting of Economic Interests, 1886–1905

William G. Roy

The vesting of interests is defined as the extent to which a government agency takes the interests of a nongovernmental actor into account in policy making and routine administration. There was a change in the distribution of economic interests vested in the U.S. State Department, as it bureaucratized during the period 1886–1905. The primary bureaucratic developments were growth in size, appointment and promotion on the basis of merit, and organizational differentiation. Analysis of data collected and by content analysis of intradepartmental correspondence shows that the interests of the financial-industrial core industries became more vested, while those of affiliated industries and peripheral industries were stable or decreased. Moreover, the types of documents most characteristic of bureaucratic organization inordinately vested core interests. It is concluded that bureaucratization affected the pattern of vested interests through the institutionalization of particular tasks in routine administration.•

This study explores the effect of the bureaucratization of the U.S. State Department from 1886 to 1905 on the development of vested interests in economic segments. During the period, the department was being transformed from a small organization of political appointees, who reacted to events as they occurred, into a large achievement-oriented organization, staffed by professional foreign-service career officers, who formulated and executed policies that shaped events.

The vesting of economic interests is here considered as the process by which a government agency routinely takes into account the economic interests of an industry or other private organization in formulating and administering public policy. The vesting agency places the industry's interests under its own jurisdiction. Interests are understood to be the potential gain or loss of resources from a decision, action, or relationship (Tilly, 1978). The term vesting is used in a sociological sense rather than a legal sense. That is, it denotes a relationship of an agency to an industry, rather than an act by an industry to vest the agency with authority. The action an industry takes to have the agency vest its interests is not part of the definition of vesting, but is an open issue. Whether vesting is explained by the industry's influence or whether the agency autonomously vests the interests is an empirical question. The concept only denotes that when the agency conducts its affairs, they take the industry into account. Any manifestation of vesting is found within the agency in how it conducts its internal affairs. Whether the source of vesting is industry influence or agency autonomy, vesting reflects a characteristic of the agency. The agency is the vestor, the industry is the beneficiary. Presumably, the more the agency takes the industry into account, the more the industry benefits from the agency's activities. Another issue left open by the definition is the role of authority relations, also an empirical question. The legal use of vesting typically denotes granting authority to another party. The authority to sentence criminals is vested in a different agency than the authority to arrest suspects. The sociological use of the term, as used here, applies to interests rather than to authority.

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To examine the relation between vesting and bureaucratization, three economic segments were delineated: the financial-industrial core, which included the railroad and closely related industries, industries affiliated with the core, and peripheral industries.

The paper examines how organizational change, especially bureaucratization, affects the distribution of vested interests. It seeks to specify why change is not neutral to groups whose interests are at stake in how the organization functions. Content analysis of intradepartmental correspondence indicates that bureaucratization in the State Department unequally benefited the financial-industrial core industries relative to affiliated or peripheral industries.

The findings are interpreted in terms of how bureaucratic tasks institutionalize practices that work to the benefit of some external organizations rather than others. The actions that serve the interests of external organizations become less dependent on the exercise of individual discretion and become embedded in administrative tasks. The result is that the vesting of interests becomes reproduced over time by bureaucratic functioning rather than by individual decisions.

The findings challenge the notion that a bureaucratic, universalistic orientation necessarily opens up an organization to a wider set of interests than does a particularistic organization. Although universalistic criteria may open up broader opportunities for many groups, they do not assure allocation of equal costs and benefits to all groups.

HISTORICAL BACKGROUND

Before presenting analysis of the data on vesting, a brief historical account of the external pressures toward bureaucratization and the particular form of bureaucratization will set the context.

Historically, there were two external influences impinging on the department's internal structure. The first was the development of a virtual consensus among political and economic leaders that expanded exports were critical for America's prosperity. Although the late nineteenth century was an era of rapid economic growth, economic swings were severe and prices followed a secular trend downward, so that the international market was generally seen as an outlet capable of absorbing the surplus production, which was thought to be the basis of these economic problems (LaFeber, 1963). The State Department assumed responsibility for stimulating exports and thereby faced the challenge of coordinating a large and complex project requiring regularized tasks (Werking, 1977).

The second influence was the attempt to rationalize government in general (Wiebe, 1967). Politically, the goal was to replace corrupt and wasteful political machines with professional staffs, rationalized bureaucratic structures, and business principles of management (Schiesl, 1980), transforming the federal government from a legislatively oriented allocator of funds into an administratively oriented regulator.

Two groups external to the State Department pressed for bureaucratization: reform groups, especially the Progressives, and imperialist expansionists like Henry Cabot Lodge. Pressure to reform the diplomatic service had been in the background since the 1860s and did not become effective until the 1890s. The efforts were spearheaded by the National Civil Service Reform League, founded in 1881, which, beginning with their 1895 annual meeting, agitated for reform of the appointment and promotion procedures (National Civil Service Reform League, 1919).

Also active in the effort were numerous expansionist journals, some expansionist politicians such as Lodge and Roosevelt, and numerous private and civic associations. Expansionist imperialists pressured the State Department to do more for trade, to modernize, and to expand in order to secure for the U.S. a place of preeminence in world affairs. They advocated political centralization to erect the state securely on a solid and enduring organizational base. The most influential outside person for State Department bureaucratization was Theodore Roosevelt, an ardent expansionist, whose executive orders were critical steps in the process (Stuart, 1949). Similarly, Senator Henry Cabot Lodge introduced reformist legislation that furthered the trend toward State Department bureaucratization (Werking, 1977). The particular forms of bureaucratization were shaped endogenously, by both expansionists and rationalizers, in the larger political context. Expansionist secretaries of state like James G. Blaine (1881, 1889–1892) and Walter Q. Gresham (1893–1895) oversaw the department's expansion and actively pursued new tasks for it to perform, thus setting the stage for later rationalizers. The rationalizers were led by men like Richard Olney and Elihu Root with close ties and ideological affinity with the major business leaders. They wielded power in an explicitly political fashion to create an administrative system in which open power would be needed less frequently. The changes did not eliminate the need to influence the department or to have friendly officials in positions of authority. But the changes did create a self-reproducing structure in which vested interests were embedded in the tasks that were performed.

METHOD

A random sample of twelve industries was drawn from Evans' (1943) categorization of industries. His categorization was selected as best retaining a breakdown corresponding to common usage, while compatible to the Standard Industrial Classification. A breakdown consistent with common usage was necessary, since the operationalization of vested interests involved content analysis of documents.

The industries were broken down into three segments (Zeitlin, Neuman, and Ratcliff, 1976), consistent with the anatomy of the period's political economy (Roy, 1980, 1981). The financial-industrial core included the railroad industry and industries intimately connected with it by common ownership before widespread industrial centralization. Core industries were directly or indirectly based on finance capital: that is, ownership was widely distributed and coordinated through the institutions of investment banking, stock exchanges, and brokerage firms. The sampled core industries were railroad, telegraph, and coal. Affiliated industries were dominated by firms that had consolidated early because of close relations with the railroads, either as preferred customers with kickbacks or through consolidation promotion, but they were not linked to the core by common ownership. Some small firms remained, but under the shadow of the dominant firm. Sampled affiliated industries were meat packing, petroleum refining, sugar refining, and distilled liquor. Peripheral industries remained outside the orbit of finance capital, at least until after the depression of 1893, at which time some of them consolidated (agricultural machinery, paper) while others remained competitive and small-scale (shoes, lumber, books).

Although industries typically included both large and small firms, the industry seemed the appropriate unit of analysis. The services performed by the State Department typically benefited an industry as a whole, even if they were the result of a vested interest in the large firms. For example, diplomatic representation to France successfully lowered French barriers to American pork in the 1890s. Even though most pork was exported by the larger packing companies, the lowered barriers made it easier for all packers to market abroad. And although there were cleavages within an industry between large and small firms, most State Department activity concerned issues that affected the firms in an industry uniformly.

The data was collected by content analysis of internal State Department correspondence. Copies of all letters and telegrams sent by the State Department in Washington to American embassies and legations and all letters and telegrams coming in from the embassies and legations were examined. Correspondence from the Washington office was offically *Instructions,* while that to the Washington office was *Despatches* (U.S. National Archives, 1963). Four countries, Turkey, Siam, Mexico, and France, were randomly drawn from those having complete sets of documents for 1886–1905 (U.S. National Archives, 1963). Great Britain was also included, since the Court of St. James was the center of international diplomatic activity. About 8,360 records were read for any reference to an industry, defined as a profit-making enterprise carried on by a private corporation, company, or trade association. Typically, industries were mentioned by reference to their product, although reference to a company or a set of companies was common. There were some references to companies as employers. In order to verify coder reliability, 11 volumes of despatches from the Mexican embassy, from 1886 to 1890, were read and coded independently by three coders.

Vesting of interest was operationalized as the relative frequency with which an industry was mentioned in the documents. The more often an industry was mentioned, the more its interests were presumed to have been taken into account. This seemed a reliable measure because there were several factors that made it likely that an industry would be mentioned if its interests were taken into account. First, the correspondence routinely covered the decision-making process from the time an issue was raised through the final execution. While grand policy discussions could mask the economic interests being served, routine administration typically required explicit mention of particular products, companies, or businessmen, so that the number of mentions over two decades in five embassies would indicate consistent and routine consideration of an industry's interests. Second, these documents recorded the complete interaction between Washington and the embassies.

There were no telephones, and personal contact was rare. Candid discussions were frequent in both confidential and nonconfidential letters and telegrams. Third, little effort was made to mask references to economic interests. Although there was some public resentment toward big businesses in the U.S., their international activities were approved (LaFeber, 1963; Werking, 1977). Finally, the data shows a strong vested interest in industries without foreign trade, which cannot be explained except in political terms.

There are, however, problems with this measurement of vested interest. Sometimes external events stimulated discussion of industries that were relatively powerless, so that the numerous mentions were not a measure of their influence with the State Department. For example, the U.S. and Canada entered into a protracted conflict over seal hunting in the Bering Straits, which caused considerable discussion with the British. The issue centered around sovereignty over coastal waters and represented a precedent-setting conflict over dominance between the U.S. and Canada. The State Department could hardly be said to have had a long term vested interest in seal hunters, even though the latter clearly benefited. Secondly, there may have been industries strongly supported by the department, that had rare occasion to use its services. For such industries, the number of mentions would not be a measure of the State Department's vesting. Although inappropriate measures remain a problem, two factors decrease their importance. First, the content analysis protocol included an item recording how positive the attitude was toward the industry. Virtually all mentions expressed a neutral stance, implying that each mention can be weighted equally when summed to include long-term vesting. The emphasis in the paper is on the ways in which routine organization and activities affected the distribution of attention given by the State Department to industries. A frequently mentioned industry was getting more attention than an infrequently mentioned industry. Secondly, the sources of error were for the most part random and incidental, not systematically and intensively biased. Counting mentions did offer a novel opportunity to measure one aspect of power in terms of the benefits gained from state action of a government agency.

For each document, in addition to the industry mentioned, two other variables were measured. The coder enumerated an item entitled "Immediate Stimulus of the Mention," coding one of 13 possibilities, plus "Not ascertainable." Only 2 percent were "Not ascertainable." The 13 codes were collapsed into three types of organizations initiating the event leading to the document: the State Department itself, the industry whose interest was vested, and all others. The coder also enumerated the mode of policy discussion, that is, whether the formulation of policy was under discussion or whether a preexisting policy was taken for granted and applied to the situation at hand. This variable was operationalized from an item entitled "General Context of Mention," which coded the type and range of policy that was being discussed in the document. Two items were combined to indicate that policy was being taken as a given: "No policy discussed," and "Routine administrative matter." Coders were instructed to interpret "discussing" policy as meaning treating policy as an open matter in the process of formulation, not as applying existing policy.

BUREAUCRATIZATION

The bureaucratic features adopted by the department during the period being studied did not equally display all the structured characteristics normally associated with bureaucratization but centered on three interrelated trends: (1) growth in size, (2) appointment and promotion on the basis of merit, and (3) organizational differentiation.

The size of the department's personnel nearly doubled during the period. It was 62 in 1882, and until the late 90s growth was rather moderate, especially during the depression years; from 1897 to 1905 there was a large jump from 71 to 119. Expenditures show a similar trend: from 1875 to 1898 the expenditures increased slightly, from $128,000 to $131,000, but by 1908 they nearly doubled to $252,000.(National Civil Service Reform League, 1919).

Although all aspects of organization were bureaucratized during the period, employment procedure was the major focus of attention (National Civil Service Reform League, 1919; Stuart, 1949; Barnes and Morgan, 1961; Ilchman, 1961; Jones, 1965; Reed, 1972; Werking, 1977). Middle-level administrators, most notably the secretaries of legation, were the initial focus of professionalization. The secretary of legation was the forerunner of today's foreign service officer but, until the bureaucratization of the department, the position was given to sons of well-to-do congressional and presidential constituents, especially easterners. Remuneration was on a fee rather than a salary basis.

Although President Cleveland in 1895 issued an executive order requiring consular appointments to be filled with civil service appointees, it was not until ten years later that Theodore Roosevelt placed all career consular and diplomatic posts under civil service regulations (Stuart, 1949).

The government gradually opened the foreign service to people from all economic backgrounds by raising salaries, providing government-owned lodgings, and underwriting travel expenses for official business. Richard Olney, in the early 1890s, instituted the first formal training of secretaries of legation, although the system lapsed during the McKinley administration (Ilchman, 1961). University training, which included language, international law and customs, and diplomatic history, was begun around the turn of the century.

Hierarchical differentiation increased on both the ministerial and staff level. The United States appointed its first minister with the rank of ambassador in 1893, after authorization by Congress. The founding fathers had felt that the title of ambassador smacked too much of European aristocracy and preferred such titles as envoy extraordinary or minister plenipotentiary. By 1906 nine ministers held the rank of ambassador (Ilchman, 1961). Hierarchical differentiation was accomplished on the staff level by creating new positions and creating posts where none had existed. In 1894 Congress created the position of secretary of embassy, of which four were appointed the following year (Ilchman, 1961). In 1900 the position of third secretary of legation was created, with positions of that title assigned to missions at London, Paris, and Berlin (Barnes and Morgan, 1961). In 1902 Congress for the first time authorized the funding of clerks at embassies and legations. By 1905 there were 48 secretarial positions, double those in 1892 (Ilchman, 1961). The system was the forerunner of the graded foreign service that was created in 1924.

These structural forms of bureaucratization were accompanied by operational manifestations. Two related trends are evident in the content analysis of State Department correspondence: (1) a trend from an incident-oriented, i.e., reactive, stance to a policy-oriented, i.e., proactive, stance (see Appendix A), and (2) a trend from individual discretion to application to policy as the criteria by which activities were evaluated.

One indication of a reactive or proactive stance is who initiates departmental activities, someone outside the agency or someone inside. Table 1 enumerates the distribution of documents by the type of organization initiating the issue discussed in document. The table indicates that the proportion of documents initiated within the department rose from 59 percent to 65 percent over the two decades, a notable if not dramatic trend.

Table 1

State Department Documents, by Initiating Organization and Decade, 1886–1905*

Initiating organization	1886–1895		1896–1905	
	N	%	*N*	%
Industries	48	12	89	15
State Department	246	59	389	65
Others	120	29	118	20
Total	414	100	596	100

*Source: Coding of U.S. National Archives, General Records of the Department, Record Group 59: Diplomatic Instructions 180[illegible]–1906, Diplomatic Despatches France 1886–1905; Great Britain 1886–1905; Siam 1886–1905; Turkey 1886–1905; Mexico 1886–1905.

An indication of whether activities were evaluated by policy rather than by individual discretion is the proportion of documents that implicitly took policy as an established fact. The proportion of all documents in which policy was seen as an established fact (Table 2) rose over the period from 62 percent to 83 percent. The trend for those records initiated by industry, an increase from 69 percent to 86 percent, suggests that matters raised by industry were increasingly handled by administratively established rules and procedures. Many discretionary actions taken in the early period in response to specific requests were eventually routinized into organizational procedures, especially requests for information. These routine tasks became the responsibility of the newly created positions of the lower professional and clerical staffs of the embassy.

The department's bureaucratization during this period should not be overemphasized. The State Department lagged behind many other departments, especially newly created departments like the departments of Commerce and Labor. Not only did the aristocratic traditions of diplomacy retard routinization, but the department became a last retreat for political spoilsmen who, having been excluded from other agencies by civil service reform, resisted bureaucratic reform in the State Department (Werking, 1977).

Table 2

Percentage of State Department Documents Treating Policy as Established Fact, by Initiating Organization and Decade, 1886–1905*

Initiating organization	1886–1895 % (*N*)	1896–1905 % (*N*)
Industries	69 (33)	86 (77)
State Department	67 (166)	83 (322)
Others	51 (61)	81 (96)
Total	62 (260)	83 (495)

*Source: See note to Table 1.

THE VESTING OF INTERESTS

It has often been pointed out that during the late nineteenth century the State Department emphasized American economic interests as strongly as in any period in its history (LaFeber, 1963; Van Alstyne, 1965; Williams, 1966). But "American economic interests" encompassed the interests of some industries more than others, in particular, those industries most closely associated with the financial-industrial core.

Table 3 shows how often the sampled industries were mentioned. The core industries predominated. Vested interest was highest in the railroad industry, which was mentioned 111 times, even though it had neither exports nor imports. There was considerable foreign investment in, and later by, the railroads, but very few of the conversations in the documents concerned investments. The documents that mentioned railroads covered a wide range of topics, such as appointment of an employee of the Chesapeake and Ohio as a vice consul in Great Britain, requests for information from American railroad

Table 3

Mention of Interests of Industries in State Department Correspondence, by Decade, 1886–1905*

	Number of documents			
Industries	1886–1895	1896–1905	Total	Rank
Core				
Railroads	28	83	111	1
Telegraph	29	16	45	3
Coal	0	3	3	10
Affiliated				
Meat packing	36	20	56	2
Petroleum refining	12	9	21	5
Sugar refining	16	17	33	4
Distilled liquor	4	14	18	6
Peripheral				
Agricultural machinery	4	3	7	9
Boots and shoes	0	1	1	11
Lumber	1	9	10	8
Books	9	3	12	7
Paper	0	0	0	12
Total	139	178	317	

*Source: See note to Table 1.

companies, American involvement in Mexican railroad construction, and protocol assistance for railroad officials traveling abroad. Total vesting in railroads increased substantially, from 28 mentions in 1886–1895 to 83 in 1896–1905 (Table 3). The telegraph industry, the industry most closely associated with the railroad, ranked third of the 12 industries sampled. Only in the coal industry, of the core industries, was the vested interest found to be low, perhaps because it was subsidiary to the industry with marginal profitability.

For the four affiliated industries together, meat packing, distilled liquor, petroleum refining, and sugar refining, vested interest was higher (68) than for core industries (57) in the first decade. However, the second decade, their score fell to 60, compared to 102 for the core industries, a drop of 14 percent, compared with the core's rise of 81 percent. The peripheral industries, agricultural machinery, boots and shoes, lumber, books, and paper, accounted for only 10 percent of the total mentions, and vested interest score for the two decades was almost identical (14 and 16). It is clear that the industries benefiting most from trends in the State Department were those at the core of the emerging financial-industrial segment.

The analysis thus far is circumstantial — it has been shown that the State Department increasingly showed a vested interest in the core industries segment, concomitantly with increased bureaucratization. Any direct association between bureaucratizing trends and the distribution of vesting among industries remains to be demonstrated.

Table 4 shows the distribution of vested interest across segments for documents initiated by the State Department or by industries and other sources for the two decades. If the documents initiated by the State Department are considered as indicative of bureaucratic operations, it is clear that over the two decades, bureaucratization benefited the core industries more than other industries, the proportion of documents increasing from 41 percent to 62 percent. In the first decade, the core industries were slightly more favored in department-initiated documents (41 percent) relative to industry-initiated documents (38 percent). In the second decade, however, department-initiated documents for the core (62 percent) were nearly twice as frequent as industry-initiated documents (33 percent). Thus

Table 4

State Department Documents, by Initiating Organization, Class Segment, and Decade, 1886–1905[*]

Initiating organization	Core		Affiliated		Peripherial		Total	
	N	%	*N*	%	*N*	%	*N*	%
Industries	6	38[†]	9	56	1	6	16	100
	5	33[‡]	5	33	5	33	15	99
State Department	33	41	38	47	10	12	81	100
	80	62	41	32	9	7	130	101
Others	17	45	19	50	2	5	38	100
	17	52	14	42	2	6	33	100

[*] Source: See note to Table 1.
[†] Numbers in first row represent 1886–1895.
[‡] Numbers in second row represent 1896–1905.

the data suggest an increasing tendency of bureaucratic procedures to lead to vested interests in core industries. Conversely for peripheral industries, in the first decade department-initiated documents showed a vested interest in peripheral industries, more frequently (12 percent) than industry-initiated documents (6 percent), but in the second decade, the scores were reversed to 7 percent for department-initiated documents and 33 percent for industry-initiated documents.

Table 5

State Department Documents, by Mode of Policy Discussion, Class Segment, and Decade, 1886–1905*

Mode of policy discussion	Class Segment							
	Core		Affiliated		Peripheral		Total	
	N	%	*N*	%	*N*	%	*N*	%
Policy as given	35	49†	30	42	7	10	72	101
	91	66‡	32	23	14	10	137	99
Policy discussion	24	34	39	56	7	10	70	100
	11	27	28	68	2	5	41	100

*Source: See note to Table 1.
†Numbers in first row represent 1886–1895.
‡Numbers in second row represent 1896–1905.

Table 5 provides further evidence that bureaucratization in itself benefited the core. For each decade, the distribution of vested interest across the three groups of sampled industries is shown for the documents in which policy is treated as a given — a policy orientation — and for documents in which policy is an open issue — a discretion orientation. The results show that policy-oriented documents show a stronger vested interest in core (49 percent to 66 percent) than discretion-oriented documents (34 percent to 27 percent) and that this relationship increased over time for the core. On the other hand, the proportion of policy-oriented documents of affiliated industries declined from 42 percent in the first decade to 23 percent in the second, whereas the proportion of discretion-oriented documents rose from 56 percent to 68 percent. For peripheral industries, vested interest was low for both orientations. Taken together, these results show that those documents most indicative of bureaucratic operation were also the documents that most strongly demonstrated vested interest in the core. These results suggested that the relationship between bureaucratization and increased core vesting was not only temporarily coincident, but integrally related.

NEW DEPARTMENTAL TASKS AND VESTED INTERESTS

The extent to which the tasks — the department's actual concrete operations — inordinately benefited the financial-industrial segment can only be suggested, considering the modest degree of bureaucratization during this period. The professionalization of personnel, especially appointment by merit, had the effect of insulating departmental personnel from personal accountability to party officials, who were more closely tied to localistic, small business interests. New tasks were introduced slowly at first, and many of them were the continuation of older policies (Werking, 1977). However, there are indications that the new bureaucratic tasks, even those tasks intended to help smaller business, benefited the financial-industrial core. During this period, the department assumed two new types of tasks: stimulating exports and gathering information. Although stimulating exports did not directly benefit the financial-industrial core, it affected the core indirectly through the railroads, which were the main source of transportation from production sites to ports. The railroad companies enthusiastically embraced the business-government consensus that exports could ease American economic and social problems, going as far as charging lower rates for shipping goods destined for export (LaFeber, 1963).

The department, to stimulate exports, began to develop lists of potential customers in each foreign country, which they distributed to American businesses, and they distributed lists of American vendors to potential customers abroad. Although these services were available to all businesses, they were typically used by exporters with more highly developed distribution and marketing facilities, which tended to be recently consolidated corporations with large-scale production (Chandler, 1977). By 1911, Charles Nagel, the secretary of commerce and labor, warned President Taft that exports were concentrated "in the hands of a very few industries, and those are precisely the ones against which the government is now proceeding in anti-trust actions" (cited in Werking, 1977: 218).

The department also began to collect various types of information on host nations. The instructions to embassies increasingly requested regular and routine information on a variety of topics (Appendix B). As a result, despatches from the embassies increasingly contained reports and newspaper clippings on political and economic affairs. These reports were the most frequent topic of documents that mentioned core industries, accounting for 42 percent of core-related documents. Although core-related documents accounted for half of all documents that showed vested interest in the sampled industries, 75 percent of the documents that concerned exchange of information on political and economic affairs showed a vested interest in core industries. Thus the increasingly important task of collecting information on the internal affairs of host countries inordinately benefited the core industries. Once tasks became instituted and embedded in routine operating rules, they became automatically perpetuated, regardless of the personal preference of either high officials or low-level functionaries. They were rarely altered, except through repoliticizing the agency, often in the context of conflict.

CONCLUSION

This paper has discussed bureaucratization in the United States State Department between 1886 and 1905 and how the pattern of vested economic interests was affected. Content analysis of intradepartmental correspondence has indicated that bureaucratization was associated with greater vesting of the interests of the financial-industrial core industries than of affiliated or peripheral industries. Not only was there a temporal association, but the types of documents most indicative of bureaucratic operation inordinately displayed a departmental orientation toward the core industries. It has been further suggested that a primary mechanism by which bureaucratization affects vesting is by institutionalizing within the administrative structure certain tasks that are more beneficial to some industries than to others. The role of individual discretion in vesting is thus reduced.

One final issue raised by this analysis is the extent to which bureaucracies are administrative instruments usable by any regime or are autonomous bases of power with which regimes must contend. This has been a highly salient issue for Weber (1978) and his followers. Weber (1978) argued that the power of bureaucracy is based on its monopoly of certain skills, its indispensability, creating a dependence upon it by both government leaders and its clients. However, this indispensability is tempered by a professional ethos, rendering the bureaucracy pliable, an instrument to be used by whichever party is in power at the time. However, as Bendix (1945) emphasizes, this argument overstates the neutrality of bureaucracy. Ideal-typical bureaucracies may be indifferent to who occupies the position of supreme authority, but they are not flexible about the tasks they are capable of performing. An organization structured to monitor trade patterns cannot easily begin to administer welfare payments. The substitution of one administrator for another is an easy procedure precisely because the tasks performed are built into the organization itself. Weber (1978) identified the reasons for such continuity: formal job definitions, specific regular activities, written rules of conduct, and the precedence of the office over the person. When Weber argued that a new top official is free to set new policy, he used "policy" in the sense of value preference. Organizational tasks, however, are tightly confined. In the State Department, as the organization bureaucratized, each new secretary of state maintained clear jurisdiction over foreign policy, but he gradually lost control over the actual concrete operations of the various bureaus.

It is in this way that the vested interests in the bureaucratic structure become "frozen." The issue of bureaucratic autonomy concerns the exercise of authority, but too little attention has been given to issues of the flexibility of the content of bureaucratic structures. One significant characteristic of bureaucracies is that the interests served become relatively independent of the policy preference of the heads of the bureaucracies. Thus, bureaucracies can be responsible to the authority of a succession of regimes, as Weber argued they should be, while at the same time the interests they serve are consistently and effectively maintained.

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APPENDIX A: Reactive and Proactive Stances in State Department Documents

The following is typical of reactive responses by the Department.

> No. 16. June 11, 1889. From Secretary of State James G. Blaine to Whitelaw Reid, ambassador to France.
>
> I enclose herewith for your information a copy of Resolutions recently adopted by the Board of Directors of the Board of Trade of the City of Chicago, relative to the prohibition by Germany and France of the importation of American hog products.
>
> It is difficult to add to the earnestness with which, during many years, the Government has remonstrated against this unjust and onerous prohibition of trade on one of the greatest staple products of our country and one which the continuous experience of long and careful observation has demonstrated to be second in health fitness to no food product of domestic or export consumption. And it is with deep regret and pain that this Government has seen the failure of the French cabinets from time to time to effect a friendly and equitable solution of the difficulty which the legislative features of the question in the Chambers have thrown in the way of adjustment.
>
> The present memorial coming as it does from the great pork producing and packing center of the United States, and representing important and widely diffused interests as well agricultural as commercial, is worthy of careful consideration . . . .

This document is a reaction not only to actions of the hog growers, but also a reaction of the hog growers to actions of the French government in response to French hog growers. This is an appeal by the secretary of state to his ambassador to remonstrate to the French government. The vested interest expressed a matter of ad hoc strategy. A later dispatch from the American ambassador at Paris shows the contrast:

> No. 304. July 25, 1898. From Horace Porter, ambassador to France, to Secretary of State William R. Day.
>
> Upon receiving your No. 387 of June 2, instructing me to ascertain the intention of the French government with regard to further negotiations for a mutual concession of minimum duty on articles of commerce exchanged between the two countries and to obtain, if possible from the Minister of Foreign Affairs, a note which would outline his views, I communicated with Mr. Delcasse and had with him several conversations on the subject. I found him apparently desirous of enlarging our commercial treaty arrangements: he said he would confer with his colleague of the Department of Commerce and let me know without delay, on what line he thought a general treaty of commerce could be made between us. I requested him to put it in writing and I am now in receipt of a note stating that he is happy to respond to my suggestion and that Mr. (illegible) had been instructed to inform you that the French government is willing to make with us a general commercial treaty on the basis of the extension of the treatment of the most favored nation to both countries, as explained in the note above mentioned, a copy and translation of which are herewith enclosed.

In this case, there is no external initiating actor mentioned. The ambassador is responding to the secretary of state. Moreover, the action contemplated is not on behalf of a particular American concern but points toward a generalized treaty that would benefit a broad range of American economic interests. The benefit would not be a one-time decision but would be policy. Earlier documents had shown that several American interests, ranging from petroleum to egg yolks, had petitioned the State Department for what they considered discrimination against American products as compared with customs rates paid by other countries, who had "most favored nation" status with France and were able to export certain products to France at lower duties. The final solution accomplished by a commercial treaty was a solution that had consequences for all American interests that traded in France, not just the particular ones that originally petitioned the department. Moreover, it was a solution that was engineered in the department and that became institutionalized in the departmental administrative structure after the treaty was signed.

APPENDIX B: Discretion and Application of Policy in State Department Documents

The shift from individual discretion to policy is evident in the following documents. This dispatch from the minister to Paris in 1888 is indicative of a document initiated by the actions of a government official:

> **No. 678. October 1, 1888. From Robert McLane, ambassador to France, to Secretary of State T. F. Bayard.**
>
> With reference to your Circular of July 10th, asking at the request of the Secretary of the Treasury for copies of laws and regulations now in force relating to artificial butter, I send herewith:
>
> 1. Two copies of the Journal Officiel of March 15th, 1887, containing the text of the law of March 14th for the punishment of frauds commiting butter [sic].
>
> 2. Two copies of the Journal Officiel of May 16th 1888, containing the decree of May 8th regulating the mode and conditions of examining and verifying all butter.

This was typical of many documents that either asked for or passed on information of use to someone outside the department. Because there was no regular procedure for collecting information, the only way to obtain or communicate information was through the ministerial correspondence. Toward the end of the period, there are more documents like the following dispatch from the minister at Mexico City, which creates a policy for collecting information.

> **No. 218. December 7, 1897. From Powell Clayton, ambassador to Mexico, to Secretary of State John Sherman.**
>
> I have the honor to enclose copy of my note to the Foreign Office written at the request of Hon. Joseph P. Smith, asking that publications of the Executive Departments of the Mexican Government be furnished this bureau . . .

The letter to the Mexican foreign minister cites Joseph P. Smith, Director of the Bureau of American Republics, Washington, DC:

> In order to carry out more efficiently the prompt dissemination of commercial information, the underlying object of the establishment of the Bureau of American Republics by the International Commercial Union, it is important that all the members of the Union should promptly transmit to me all publications, documents, and laws which concern their material progress, their relations to the other countries, their internal affairs, and their regulations of commerce in the broadest signification.

The information was to be transmitted through the department, indicating that the collection of information was not only expanding but was becoming routinized.

The policy created in the previous document set the stage for an increasing number of documents like the following, which did not require the exercise of individual initiative or discretion but reflects the administration of departmental policy:

> **No. 2571. December 21, 1904. From Powell Clayton, ambassador to Mexico, to Secretary of State John Hay.**
>
> I have the honor to forward under separate cover for the Bureau of American Republics copies of the following publications:
>
> Boletin de Estadistica Fiscal, November, December, 1903, January, February, March 1904; Exports and Imports, May, June, July, 1904; 32 Contracts relating to railroad and steamboat lines.

Leadership and Networking among Neighborhood Human Service Organizations

Joseph Galaskiewicz and Deborah Shatin

This study investigated the hypothesis that under conditions of environmental uncertainty, leaders of neighborhood human service organizations would establish cooperative relations on the basis of their own personal connections in the neighborhood or their status group affiliations. Data on the cooperative working relationships among 181 human service public and private nonprofit organizations were examined in four Chicago neighborhoods. In all four neighborhoods, organizations whose leaders had common organizational memberships tended to have cooperative ties with one another. However, in more turbulent areas, public and private organizations whose leaders had a similar racial or educational background were more likely to establish cooperative relationships with one another.•

Few would question that leadership has an effect on the goals and structure of complex organizations. After an initial inconclusive debate in the 1950s and 1960s (Gouldner, 1954; Guest, 1962; Grusky, 1963, 1964; Gamson and Scotch, 1964), there followed a host of studies that showed that the personal networks and status group loyalties of individuals in executive positions affected leadership succession (Zald and Berger, 1978), promotions (Butler, 1976; Kanter, 1977), the structure of industries (Denzin, 1977), access to information about jobs (Granovetter, 1974), and the success or failure of business ventures (Light, 1972; Bonacich, 1973). (See also Meyer, 1975; Allen, Panian, and Lotz, 1979).

Curiously, there has been little systematic research on how extraorganizational loyalties, commitments, and the personal networks of those in executive positions affect the formation of cooperative relations among organizations (Laumann, Galaskiewicz, and Marsden, 1978). Political sociologists have shown how overlapping organizational memberships can result in political coalitions among elites (Perrucci and Pilisuk, 1970), but no one has examined how or under what conditions those in executive positions utilize their own connections and draw on their own personal loyalties to establish operational interorganizational relations.

In this paper the focus is on interorganizational cooperation among neighborhood human service organizations. So-called "leadership effects" have been found in the delivery of welfare services as they have in other industries. Warren, Rose, and Bergunder (1974) examined and documented the effects of "leadership style" in War on Poverty organizations; Alford (1975) described how health care policy in New York City emerged from conflict between divergent interest groups in the health care field, and Gosnell (1937) and Kornblum (1974) described how the ethnicity, religion, and social class of ward leaders of urban political machines influenced decisions as to who would receive welfare services. In these studies it was again clear that leadership characteristics affected organizational decision making and operations. However, the literature on community organization has neglected leadership effects on interorganizational network formation as well.

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THEORY

Levine and White (1961), in their pioneering study of interorganizational relationships, showed "networking" to be an important social process among human service organizations. The predominant theoretical framework for research in this area, as Laumann, Galaskiewicz, and Marsden (1978) pointed out, has been resource dependency theory (Yuchtman and Seashore, 1967; Aldrich, 1976, 1979; Benson, 1975), in which it is assumed that neighborhood organizations negotiate cooperative efforts with one another in a quasi-market environment characterized by a lack of regulation and an emphasis on rational self-interest. Specifically, organizations strive to secure necessary resources for their continued functioning, and relations among organizations are most often short-term and typically involve the exchange of one resource for another. The outcomes of such exchanges are typically unequal, and quite often one or two organizations emerge with clear power advantages over others in the organizational field (Emerson, 1962; Cook, 1977; Cook and Emerson, 1978).

In contrast to this position, we suggest that networking among organizations, here defined as the formation of cooperative relationships, can be based as much on particularistic criteria, such as the personal networks of organizational leaders and status targeting, as on strict cost-benefit calculations in terms of resource procurement. We argue, further, that leadership effects should be more evident under conditions of environmental turbulence and uncertainty (Pfeffer, Salancik, and Leblebici, 1976). That is, we expect that organizational leaders will use their personal connections and their status group affiliations as a basis to form interorganizational relations in order to minimize uncertainty in a turbulent environment (Terreberry, 1968).

This is not to argue that competition for resources is not central to interorganizational networking. Rather, our position is that, under conditions of turbulence and uncertainty, leaders will target their networking efforts on the basis of who they know personally or who they believe share their loyalties and personal values. Organizational leaders will still try to negotiate the "best deal" in terms of resource exchange; however, circumstances will force them to pay special attention to the dependability and trustworthiness of their exchange partners.

HYPOTHESES

Given environmental turbulence and organizational uncertainty, we expect that neighborhood organizational leaders — whether school principals, clergy, association presidents, government or agency administrators — will rely on their personal connections in the neighborhood to establish interorganizational networks. In a more turbulent task environment, such leaders will assume a more defensive posture and will, therefore, be more likely to direct their networking efforts at organizational leaders who they believe they can depend on. Previous research has demonstrated that networks formed in one setting can predict the formation of networks in other settings (Laumann and Pappi, 1976). We build on this finding to hypothesize that personal connections with other organizational leaders through overlapping local organizational memberships will, in turn, be translated into interorganizational cooperative relationships under conditions of environmental turbulence and organizational uncertainty.

Hypothesis 1. There should be a stronger correlation between organizations having cooperative relations and organizational leaders having joint organizational memberships in more turbulent neighborhood environments than in less turbulent neighborhood environments.

A second strategy that leaders could pursue in turbulent environments is to direct their networking efforts at other leaders who have similar status group affiliations. In an attempt to overcome uncertainty in turbulent environments, leaders would seek out those who they believe are at a lesser social distance, i.e., who have a common ethnic, religious, or educational background, even though they may not know these individuals personally.

Hypothesis 2. There should be a stronger correlation between organizations having cooperative relations and leaders having similar racial, religious, or educational backgrounds in more turbulent neighborhood environments than in less turbulent neighborhood environments.

Finally, we expect that leaders who live in a neighborhood are at an advantage, given a turbulent environment, compared to leaders from outside the neighborhood. We will assume that local leaders have access to information on the neighborhood, through neighboring networks, that outside leaders do not, and this supplementary information overcomes some of the uncertainty caused by environmental turbulence. As a consequence, local leaders need not be as defensive as outside organizational leaders toward potential interorganizational partners as outside organizational leaders.

Hypothesis 3a. In turbulent neighborhood environments, there should be a stronger correlation between organizations having cooperative relations and leaders having joint organizational memberships when leaders live outside an area than when leaders live in the area.

Hypothesis 3b. In turbulent neighborhood environments, there should be a stronger correlation between organizations having cooperative relations and leaders having similar racial, religious, or educational backgrounds when leaders live outside the area than when leaders live in the area.

Since we anticipated that networking among organizations might also have been influenced by other factors, we introduced several control variables into the analysis, specifically, the effects of organizational size, sponsorship, and goals on interorganizational relations. Allen (1974) and Galaskiewicz (1979) found that larger organizations are more likely to enter into cooperative relations than smaller organizations. Typically, larger organizations are characterized by greater diversification and, thus, potentially have more points of contact with other organizations. Although the effects of sponsorship are difficult to anticipate, accounts of how public and private voluntary and bureaucratic organizations function in a neighborhood setting (Molotch, 1972; Fish, 1973; Warren, Rose, and Bergunder, 1974) suggested that organizations having different sponsorship pursue different strategies. Finally, the goals of organizations might be particularly relevant to the hypotheses. Hawley (1951: 211, 217–218), among others, argued that under conditions of uncertainty organizations are more likely to establish close working relationships with other units engaged in similar types of activities. Although such interorganizational linkages do not necessarily promote positive collective action, they do enable leaders to establish solidarity with their competitors and to monitor their behavior.

DATA AND METHODS

The data for this paper were gathered in 1973 by Irving Spergel, Brenda Strickland, and Joseph Galaskiewicz as part of Spergel's (1976) research on the juvenile criminal justice system. The sample included a wide range of social welfare organizations in four Chicago neighborhoods — Heart of Chicago, Pilsen, Little Village, and Near West Side. Of the 302 organizations identified as pursuing social service activities in the four neighborhoods, 29 out of 49 organizations in Heart of Chicago were interviewed, 35 out of 70 in Pilsen, 78 out of 113 in Little Village, and 39 out of 70 in Near West Side. The highest ranking officer or administrator in each organization, e.g., president, principal, clergyman, program director, or chief executive, was interviewed on the assumption that the chief executive had the best information on the organization (Galaskiewicz, 1979: 54–57). Due to time and budget constraints, the sample was limited to the largest and most visible organizations in the communities, 181 in all. These include 28 public schools, 11 health agencies, 39 churches, 24 community organizations, 6 city parks, 14 voluntary associations, 5 political party organizations, 35 general welfare agencies, 17 youth service agencies, and 2 police units. There did not seem to be any overriding bias in the sample; however because the organizations studied were not randomly chosen, the findings are not generalizable to even the population of organizations in these communities.

Environmental Turbulence

Demographic information from census data on the populations in the four neighborhoods, as well as the city of Chicago, was used to operationalize the degree of turbulence in the environment of the organizations studied (Appendix). We chose to operationalize turbulence, instead of organizational uncertainty, because of the difficulties of constructing reliable subjective measures of environmental uncertainty (Tosi, Aldag, and Storey, 1973). It should be pointed out, however, that to use an objective measure of environmental turbulence and to infer organizational uncertainty can present problems as well, especially since neighborhood conditions impinge differently on social service organizations.

The turbulence or placidity of an organization's neighborhood environment can be described along a number of dimensions (Dill, 1958; Thompson, 1967; Aldrich, 1972). The three that were analyzed in this study focused on the clientele of the organizations: stability and instability, homogeneity and heterogeneity, and richness and leanness. Although other features of an organization's environment were ignored (e.g., sources and amounts of funding) we believed that, in the long run, variation in the client population is the most important contingency that people-processing and people-changing organizations face.

The stability of a neighborhood's residents was determined by comparing the ethnic and income groups residing in a neighborhood in 1960 and 1970. Based on this criterion, Near West

Side, a poor black community in both 1960 and 1970, was clearly more stable than Little Village, Heart of Chicago, or Pilsen (Appendix), all of which experienced a substantial Latino immigration and a considerable drop in median family income, relative to city-wide income. We suspected that the relative stability of a population was an important aspect of the task environment of a social welfare organization. A rapid turnover in population strains the administrative apparatus of a social service system, and accommodating a population having a different first language would be an additional strain.

The homogeneity or heterogeneity of a neighborhood's residents was measured by examining the extent to which occupational and ethnic groups were proportionately represented in the area. Indices of dissimilarity for eleven occupational and eighteen ethnic-racial groups were computed for each neighborhood. Occupational and ethnic or racial indices of dissimilarity were based on differences in percentage distributions comparing each neighborhood with city-wide statistics (Gibbs and Martin, 1962; Martin and Gray, 1971). Thus the smaller the index for a community, the more similar it was to the city-wide distribution and, thus, the more heterogeneous. Near West Side and Pilsen appeared to be more homogeneous than Little Village or Heart of Chicago along both dimensions (Appendix). In Near West Side, service workers and machine operators were overrepresented, whereas in Pilsen, laborers and machine operators were overrepresented; Near West Side was almost totally Black, whereas Pilsen was nearly half Mexican.

The richness or leanness of a neighborhood's service clientele was determined by ascertaining the median family income and the percent of families with incomes under $3000. On this basis, Pilsen and Near West Side were poorer than Little Village and Heart of Chicago (Appendix). In terms of our typology, the residents of Little Village and Heart of Chicago were then more attractive to agencies. With fewer resources of their own, these people were less capable of sustaining themselves and thus more dependent upon social welfare services for their survival.

Although there was not complete congruence across the three measures of environmental turbulence, it seemed that the client populations in Little Village and Heart of Chicago presented a greater challenge to social service agencies than the populations in Pilsen and the Near West Side. We expected, then, that the relations hypothesized for more turbulent environments would hold true for organizations in Little Village and Heart of Chicago, while relations hypothesized for less turbulent environments would be borne out for organizations in Pilsen and the Near West Side.[1]

Interorganizational Cooperation

To measure interorganizational cooperation informants were simply asked: "In regard to your program generally, with which separate organizations in this community has your organization had the most cooperative relationships in the past 12 months?" Respondents were free to name as many organizations as they wished. From these data four matrices were constructed for the organizations studied in Heart of Chicago (29), Pilsen (35), Little Village (78), and Near West Side (39). A linkage between two organizations was recorded if organization *i* mentioned that it cooperated with organization *j*, thus retaining the asymmetry of the relation. Organizations that were mentioned but that were not part of the sample were not included in the analysis.[2]

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[1] Obviously, the four neighborhoods did not differ as much as neighborhoods in Chicago can differ. Ideally, neighborhoods from the entire metropolitan area should have been sampled. However, the data were collected before the formulation of the theoretical questions posed in this paper. Because there was no great variation across communities, the measures of environmental turbulence should be interpreted with some caution.

Organizational Goals

During the interview, informants were also asked to state, in their own words, the main functional goals of their organizations. Approximately 50 different goals were mentioned across the sample. For simplicity, these were collapsed into three general categories — community planning and development, providing social service, and enhancing community consensus and solidarity. Each organization articulated at least one of these general goals, and many mentioned all three. If for a pair of organizations there were no discrepancies in the pair's listing of goals, the pair was considered to have similar goals; if there was even one discrepancy, then the pair was considered dissimilar. To summarize the similarity and dissimilarity of all organizational pairs in each community, four symmetric binary matrices were generated, with "1" indicating that a pair had similar goals and "2" that it had dissimilar goals.

Organizational Size and Sponsorship

Organizational size was measured by summing the unduplicated total number of clients and members that organizations served locally in one month (staff not included unless also members) Because the distribution on this variable was highly skewed, the data were recoded so that organizations that had 100 or fewer clients or members were considered small (54.8 percent), and organizations that had more than 100 clients or members were considered large (45.2 percent). The sponsorship of the organization was determined by whether the organization was a public agency (37.0 percent), a private agency or voluntary association (41.4 percent), or a church (21.5 percent).

Leader's Residence and Membership in Local Organizations

Residence was measured by whether the leader of the organization resided in the neighborhood (35.9 percent) or outside the neighborhood (62.4 percent).

To determine if two leaders were in personal contact through an overlapping membership, respondents were asked to list the organizations of which they were members. Since all 181 leaders provided this information, an *N* by *N* symmetric matrix was constructed for each community, where "1" indicated that two leaders had at least one organizational membership in common and "2" indicated that they had no common memberships.

Racial, Ethnic, and Religious Backgrounds of Leaders

Finally, at the end of the interview, respondents were asked about their racial and ethnic identity, their religious preference, and their education. Responses were recoded so that leaders were identified as either "white," "black," or "Spanish-speaking"; "Protestant," "Catholic," "Jewish," "agnostic," or "fundamentalist"; and having a "professional degree," "college degree," or "high school degree or less." Respondents who could not be placed in these categories were given a missing data code. Three separate matrices were constructed for each neighborhood, to describe how similar the leaders of two organizations were on these three criteria. If the leader of organization *i* had the same racial and ethnic identity as the leader of organization *j* then "1" was entered in the *i,j* cell of the matrix describing racial and ethnic similarity; if their racial and ethnic identities were different, a value of "2" was given. Similar matrices were created for religious identities and educational backgrounds. This resulted in the construction of 12 matrices describing leaders' common status group affiliations in the four neighborhoods.

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[2] Research has shown that there are different dimensions to an interorganizational relationship. For example, Marrett (1971) and Aldrich (1976) argued that one should measure the intensity of the relationship, the degree to which it is formalized, the degree to which it is standardized, and whether or not it is reciprocal. Galaskiewicz (1979), on the other hand, argued that one must distinguish between transactions of money, information, and moral support, since different normative standards govern the exchange of each. Furthermore, Turk (1973), Aldrich (1976), and Hall et al. (1977) drew a distinction between mandated and voluntary relationships. Although we recognize that there are several dimensions to an interorganizational relationship, we decided to use only one binary measure of cooperation. This operationalization of cooperation greatly facilitates the data analysis.

RESULTS

Overlapping Memberships

To test the first hypothesis four sets of interorganizational dyads, one for each of the four Chicago neighborhoods, were examined. The ratio of "cooperative ties" to "no ties," under the condition that two leaders had an overlapping membership, was compared to the same ratio under the condition that leaders had no overlapping memberships. The ratio of the first ratio to the second ratio was then compared across the four neighborhoods. According to hypothesis 1, the ratio of the two ratios should have been greater in the more turbulent neighborhoods — Little Village and Heart of Chicago — than in the Near West Side and Pilsen.

In Table 1, the ratios of "cooperative ties" to "no ties', conditional upon the overlapping membership of leaders, were compared over the $N(N-1)$ dyads in each neighborhood: for example, in Heart of Chicago, with an overlapping membership, the ratio of cooperative ties to no ties (13/9) was 1.44, whereas without an overlapping membership, the ratio (82/737) was .11. The ratio of ratios, the measure of association between cooperation and common membership, was then (1.44/.11 =) 13.09. To the extent that this last ratio is greater than 1, there was a greater likelihood that overlapping memberships were a factor in establishing linkages among organizations.

Table 1

Ratios of "Cooperative Ties" to "No Ties" by Overlapping Memberships and Neighborhood

Memberships of Leaders	Heart of Chicago	Little Village	Near West Side	Pilsen
Overlapping	1.44	1.32	1.75	1.50
No Overlapping	.11	.04	.15	.13
Ratio of ratios	13.09	32.00	11.67	11.54

To summarize the findings in Table 1, overlapping memberships were unexpectedly important in all four communities. They were considerably more important in Little Village but they were only slightly more important in the Heart of Chicago — the two more turbulent neighborhood environments.

To determine whether the association between overlapping memberships and interorganizational cooperation might have been spurious due to organizational size, sponsorship, or goals, a series of loglinear logit models were tested. Logit models are useful in that they allow treating a dichotomous variable as a dependent variable and a set of nominal-level variables and their interaction terms as independent variables. In the present study, interorganizational cooperation was the dependent variable and overlapping membership, size, sponsorship, and goals were independent variables. It should be kept in mind that, in the construction of the cross-classified table, cooperation, overlapping membership, and similarity and dissimilarity of goals were characteristics of each dyad i,j in the network; and sponsorship and size were characteristics of each organization i.

The simple logit model tested is expressed in the equation:

$$\begin{aligned} \text{Logit}_{ijklm} &= \log (r_{1jklm}/r_{2jklm}) \\ &= (u_{1(1)} - u_{1(2)}) + (u_{12(1j)} - u_{12(2j)}) + (u_{13(1k)} - u_{13(2k)}) \\ &\quad + (u_{14(1l)} - u_{14(2l)}) + (u_{15(1m)} - u_{15(2m)}) \\ &= w + w_{2(j)} + w_{3(k)} + w_{4(l)} + w_{5(m)} \end{aligned}$$

where r_{ijklm} is the expected value for cell $ijklm$ under a given model, Logit_{ijklm} is the log of the ratio of expected values for $i = 1$ and $i = 2$, and variables 1, 2, 3, 4, and 5 correspond to interorganizational cooperation (1 = yes, 2 = no), overlapping membership (1 = yes, 2 = no), organizational goals (1 = similar, 2 = dissimilar), sponsorship (1 = public, 2 = private, 3 = church), and size (1 = large, 2 = small).

Table 2 presents the goodness of fit statistics for the four models tested. As is necessary in estimating parameters for a logit model, the four dimensional marginal totals corresponding to the explanatory variables (variables 2 through 5) were taken as fixed. The appropriate w terms could then be computed directly from the u terms derived from the loglinear model (Fienberg, 1977: 79). It should be remembered that the u terms, 12, 13, 14, and 15, correspond to the first order effects between interorganizational cooperation and the four independent variables — overlapping membership, goals, sponsorship, and size. The maximum likelihood test statistic (G^2) for each model showed that in all four cases there was an adequate fit of the data.

Table 2

Goodness of Fit Tests for Loglinear Models Including Interorganizational Cooperation (1), Overlapping Memberships (2), Goals (3), Sponsorship (4), and Size (5)

	Fitted Model	G^2	*df*	*p*
Heart of Chicago	[2345] [12] [13] [14] [15]	17.54	18	.487
Little Village	[2345] [12] [13] [14] [15]	11.72	18	> .500
Near West Side	[2345] [12] [13] [14] [15]	15.09	18	> .500
Pilsen	[2345] [12] [13] [14] [15]	17.30	18	> .500

The logit effects for the four models are presented in Table 3, where the higher the value of the coefficients, the greater the effect of the independent variable on the dependent variable.[3] The logit effects for common membership show basically the same pattern found for the simple ratios. The logit $w_{2(j)}$ in Little Village was much greater than in other neighborhoods, with Heart of Chicago a distant second, again providing only limited support for hypothesis 1.

Although we did not offer any formal hypotheses for our control variables, we did expect to find certain patterns in our data. Table 3 presents these results as well. We expected that organizations that had similar goals would tend to cooperate with one another if the environment was more turbulent and to

[3] The p-values for the w, or logit terms, are not given because we cannot draw inferences about the population of interorganizational relationships in these four communities. First, the sample is not a random sample of organizations. Second, even if it were a random sample, there would still be some question as to whether each $N(N-1)$ dyad was truly independent, sampling on N observations.

Table 3

Logit Terms (w-terms) with Interorganizational Cooperation as Dependent Variable and Overlapping Memberships, Goals, Sponsorship, and Size as Independent Variables

Cooperation and Independent Variables		Heart of Chicago	Little Village	Near West Side	Pilsen
Overlapping membership	$w_{2(j)}$	1.142	1.160	.948	1.120
Similar goals	$w_{3(k)}$	.228	.060	–.034	–.128
Sponsorship	$w_{4(l)}$				
Public		.062	–.128	–.016	–.058
Private		–.460	–.244	–.536	–.420
Church		.398	.370	.554	.478
Size	$w_{5(m)}$	.162	.342	.162	.226

avoid each other otherwise. In Heart of Chicago and Pilsen, the effects were as we expected. In the other two communities, they were not. We also expected that larger organizations would cooperate more with other organizations than smaller organizations, regardless of the environment, and this was essentially what we found. We had no specific expectations for sponsorship, yet sponsorship had very strong effects on cooperation. In all four neighborhoods, churches were much more likely to establish interorganizational relations than private organizations or public agencies, and private organizations were much less likely to cooperate than public agencies or churches.

Status Group Affiliations

The data presented in Table 4 are similar to those for overlapping memberships. The "ratio of ratios" measures the likelihood of two organizations cooperating, given that leaders have the same or different backgrounds. As hypothesized, cooperating with someone who had the same racial or educational background was much more likely in the more turbulent neighborhood environments, Heart of Chicago and Little Village, than in the less turbulent neighborhoods, Pilsen and Near West Side (Table 4). There was, however, no pattern with respect to religious background.

Table 4

Ratios of "Cooperative Ties" to "No Ties" by Racial, Educational, and Religious Background of Leaders and Neighborhood

Characteristics of Leaders	Heart of Chicago	Little Village	Near West Side	Pilsen
Racial background				
Similar	.15	.06	.21	.21
Dissimilar	.08	.03	.13	.14
Ratio of ratios	1.87	2.00	1.61	1.50
Educational background				
Similar	.18	.07	.19	.18
Dissimilar	.11	.05	.17	.17
Ratio of ratios	1.64	1.40	1.12	1.06
Religious background				
Similar	.14	.07	.17	.21
Dissimilar	.11	.06	.18	.17
Ratio of ratios	1.27	1.17	.94	1 24

To determine whether these effects were also independent of organizational size, sponsorship, and goals, we tested logit models with the measures of racial and educational similarity or dissimilarity, replacing overlapping membership, as independent variables. Since no variation was found across neighborhoods in the effect of religious background on cooperation, a logit model that included this variable was not tested.

Table 5 presents the maximum likelihood statistics for the models tested. The G^2 test statistic for each model shows that in all but two cases, the hypothesized model, including only first-order effects, fitted the data.

Table 5

Goodness of Fit tests for Loglinear Models Including Interorganizational Cooperation (1), Racial and Educational Background of Leaders (2), Goals (3), Sponsorship (4), and Size (5)

Similarity of Racial Background				
Neighborhood	**Fitted Model**	G^2	*df*	*p*
Heart of Chicago	[2345] [13] [15] [124]	22.93	16	.116
Little Village	[2345] [13] [15] [124]	18.26	16	.308
Near West Side	[2345] [12] [13] [14] [15]	13.22	16	> .50
Pilsen	[2345] [12] [13] [14] [15]	16.57	16	> .50
Similarity of Educational Background				
Heart of Chicago	[2345] [12] [13] [14] [15]	25.39	18	.115
Little Village	[2345] [12] [13] [14] [15]	26.06	18	.098
Near West Side	[2345] [12] [13] [14] [15]	16.70	18	> .50
Pilsen	[2345] [12] [13] [14] [15]	15.07	18	> .50

Due to the interaction terms in the first set of models in Table 6, the four models that include the educational background of leaders as an independent variable are considered first. If we examine the logit effect, $w_{2(j)}$, for each of the four neighborhoods, we see that, as hypothesized, the effect of education on cooperation is much greater in the two more turbulent neighborhoods, Heart of Chicago and Little Village. However, the educational background of leaders is not the most important

Table 6

Logit Terms (*w*-terms) with Interorganizational Cooperation as Dependent Variable and Racial and Educational Background of Leaders, Goals, Sponsorship, and Size as Independent Variables

Cooperation and Independent Variables		Heart of Chicago	Little Village	Near East Side	Pilsen
Similar race	$w_{2(j)}$	.062	.278	.248	.166
Similar goals	$w_{3(k)}$	.254	.044	–.048	–.072
Sponsorship	$w_{4(l)}$				
Public		.188	–.126	–.012	–.034
Private		–.255	–.138	–.480	–.464
Church		.068	.264	.468	.500
Size	$w_{5(m)}$	.094	.328	.144	.242
Similar race/ sponsorship	$w_{24(jl)}$				
Public		.280	–.006	—	—
Private		.310	.332	—	—
Church		–.590	–.324	—	—
Similar education	$w_{2(j)}$	.184	.196	.016	.062
Similar goals	$w_{3(k)}$	.244	.040	–.068	–.076
Sponsorship	$w_{4(l)}$				
Public		.134	–.042	–.020	–.022
Private		–.528	–.354	–.528	–.474
Church		.394	.398	.546	.496
Size	$w_{5(m)}$	.124	.354	.102	.244

factor explaining interorganizational cooperation in any of the areas. In fact, in all four neighborhoods, sponsorship had the strongest effect on cooperation. For example, churches, in comparison to public agencies and private organizations, were more likely to cooperate with other organizations. Furthermore, organizational goals were more important than educational background in Heart of Chicago, and size was more important than education in the other three neighborhoods.

The models that included the racial background of leaders were more difficult to interpret. We hypothesized that the logit terms, $w_{2(ij)}$, would be greater in Heart of Chicago and Little Village than in the other two communities, but the hypothesis was not supported. Rather, the effect of race on cooperation was conditional upon sponsorship in the two more turbulent environments. As for the interaction terms (see Table 6), in both Little Village and Heart of Chicago, leaders of private organizations tended to interact with organizations whose leaders had the same racial background as they did. In Heart of Chicago, leaders of public agencies also interacted more with leaders of the same racial background. In contrast, churches tended to interact with organizations whose leaders were of a different racial group.

Leader's Residence

To test hypothesis 3, only Little Village and Heart of Chicago were examined, with the focus on the association between the three background characteristics: organizational memberships, interorganizational cooperation, and the residence of organizational leaders.

It is clear from the ratios in Table 7 that residence does not have a consistent effect on the association between racial, religious, or educational background and cooperation. In Heart of Chicago, outsiders tended to affiliate with leaders of the same race more than locals did; in contrast, locals in Little Village affiliated more with leaders of the same race than outsiders did.

Table 7

Ratios of "Cooperative Ties" to "No Ties" by Racial, Religious, and Educational Backgrounds of Leaders, Overlapping Memberships, Residence of Leaders, and Neighborhood

	Heart of Chicago		Little Village	
Characteristics of Leaders	Non-local Residency	Local Residency	Non-local Residency	Local Residency
Racial background				
Similar	.14	.17	.07	.05
Dissimilar	.06	.13	.04	.02
Ratio of ratios	2.33	1.31	1.75	2.50
Religious background				
Similar	.10	.17	.08	.04
Dissimilar	.09	.14	.07	.04
Ratio of ratios	1.11	1.21	1.14	1.00
Educational background				
Similar	.15	.24	.08	.04
Dissimilar	.09	.14	.05	.04
Ratio of ratios	1.67	1.71	1.60	1.00
Memberships				
Overlapping	1.00	1.57	1.55	.91
No overlapping	.10	.13	.05	.03
Ratio of ratios	10.00	12.07	31.00	30.33

Religion did not seem to be a factor in either community. Further, in Heart of Chicago there was not much difference between locals and outsiders with respect to education; however, in Little Village, outsiders tended to affiliate more with leaders having the same education than locals did. Finally, residence did not affect the impact of overlapping memberships on interorganizational cooperation at all. Regardless of whether a leader was a local or an outsider, in these two more turbulent neighborhood environments, overlapping memberships of leaders were closely associated with interorganizational cooperation.

DISCUSSION OF RESULTS

In all, organizations were more likely to cooperate if leaders had overlapping organizational memberships. Since the data are not longitudinal, it is not possible to say whether the overlapping memberships were established before or after interorganizational relations developed. We offered a theory that would explain why interorganizational cooperation would follow upon overlapping memberships. We are not sure why overlapping memberships might follow upon cooperation, unless this would be a strategy by leaders to monitor those upon whom they had become dependent.

Contrary to hypothesis 1, joint memberships were not more highly correlated with cooperation in the more turbulent neighborhoods than in the less turbulent neighborhoods. Only in Little Village was there an especially strong correlation between overlapping membership and cooperation. This may have been due to its having a large number of organizations, 78, in contrast to only 29, 35, and 39 organizations in the other neighborhoods. The larger size of the field may have added an element of uncertainty not found in the other networks.

Hypothesis 2 received stronger support. In the more turbulent environments, Heart of Chicago and Little Village, organizations whose leaders had similar racial and educational background tended to cooperate more. This was not true in Near West Side and Pilsen. Leaders' religious background, however, had no significant effect on cooperation in any of the four areas. We did discover an interesting interaction effect. In the more turbulent areas, leaders' backgrounds had a much stronger effect on interorganizational cooperation for private agencies (and less so public agencies) than for churches. In the latter case, cooperation was found where leaders had very different racial and educational backgrounds. This last finding is intriguing; but unfortunately we do not have an explanation for it.

Finally, looking at only the two more turbulent neighborhoods, we found that leaders' residence had no consistent effect either on how racial, religious, or educational backgrounds affected interorganizational cooperation or on how overlapping memberships affected the establishment of cooperative ties.

Needless to say, the four networks studied were only exploratory populations of organizations, and a more rigorous research design is needed to test the hypotheses fully. For example, samples of organizations in a community need to be scientifically drawn. Also a wider range of communities needs to be studied, so that there is greater variation in the independent variables. Nevertheless, the data suggest that criteria other than that related to simple resource procurement, such as finding dependable interorganizational partners, are important in establishing interorganizational relations.

IMPLICATIONS

In addition to refining resource dependency theory and extending the research on organizational leadership, we believe that the findings have other implications as well. For example, we found that interorganizational cooperation was related to leaders having similar status affiliations, such as racial or educational backgrounds. We would argue that such a practice in all likelihood reduces the chances of organizations linking up with other organizations from which they can secure the resources they need. Although using status affiliations to establish relations might overcome uncertainty problems for the individual leader, the overall efficiency of resource allocation in the network is probably reduced.

Furthermore, by looking at the bases of interorganizational cooperation, it is possible to make predictions about the roles that organizations would assume in community conflict. For example, if an issue crystallized around shared status group loyalties in a neighborhood in which interorganizational relations were based on racial or educational criteria, then the findings would lead one to expect that private agencies might be at the center of opposing political coalitions. Because interorganizational linkages were already based on shared status group loyalties, these organizations could more easily transform cooperative organizational relationships into political coalitions. In contrast, we would expect that churches would be key integrating elements during community crises especially if the issue were racially related, since churches had a proportionately greater number of interracial relationships. Thus, they would have the channels through which to mediate the conflict.

At this stage of our research we can only speculate on these issues. It is for future research to document empirically if cooperative networks, based on leadership traits and personal networks, affect the efficiency of resource allocation in neighborhood human service organizations and the evolution of organizational roles in local community conflict.

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APPENDIX: Population Characteristics and Indices of Dissimilarity for Chicago and Four Chicago Neighborhoods (1960, 1970)*

Characteristics	Chicago	Heart of Chicago	Little Village	Pilsen	Near West Side
Population count					
1960	3,550,404	26,639	60,940	21,809	26,604
1970	3,366,957	23,770	62,848	20,728	19,409
Black (%)					
1960	22.90	.08	5.90	2.32	94.38
1970	32.74	2.21	10.23	2.61	97.81
Mexican or Puerto Rican (%)					
1960	2.16	3.56	1.80	27.34	2.46
1970	4.78	28.61	23.30	55.61	.60
Median family income					
1960	$ 6,738	$6,189	$6,408	$5,426	$3,112
1970	$11,418	$9,461	$9,630	$8,935	$5,611
Income under $3,000 (%)					
1960	13.60	13.02	11.90	17.06	40.44
1970	9.34	9.87	9.84	12.34	29.79
Index of occupational dissimilarity		16.73	19.20	23.66	24.93
Index of ethnic and racial dissimilarity		37.03	22.50	56.76	65.46

*Source: 1960 and 1970 Census of Population, U.S. Department of Commerce. Bureau of the Census.

Bureaucratic versus Craft Administration: The Relationship of Market Structure to the Construction Firm

Robert G. Eccles

This paper examines subcontracting and characteristics of firms in the construction industry. It argues that subcontracting by general contractors can be explained by complexity, size, and market extent. Data are provided to substantiate these claims and to disconfirm the hypothesis that subcontracting is a response to seasonal variability, a major alternative explanation. Extensive subcontracting has implications for the nature of the construction firm. The paper then examines Stinchcombe's (1959) thesis that construction firms are managed through craft administration. It is argued that firm size, role in the production process, and census classification problems are better explanations for the administrative structure of construction firms. This raises questions about the validity of Stinchcombe's thesis.•

Two prominent characteristics of the construction industry are the organization of the production work force into a variety of trades and the practice of subcontracting portions of a project to special trade contractors by general contractors. This paper addresses several issues related to the determinants of these characteristics and their implications for the firm.

The classic statement on the firm in the construction industry is still Stinchcombe's (1959); he contrasted the bureaucratic administration of manufacturing firms with the craft administration of construction firms. He stated that variable (seasonal) workload conditions in the construction industry make bureaucratic administration inappropriate and that craft socialization of workers enables them to perform tasks typically performed by administrators in manufacturing firms. The result is a simpler and less expensive administrative component. For both empirical and theoretical reasons, it is important to reconsider Stinchcombe's theoretical argument and the empirical evidence supporting it.

Stinchcombe confounded craft socialization with subcontracting, and in doing so, he mixed levels of analysis. In contrasting manufacturing firms with construction projects comprised of a general contractor and subcontractors, he was examining both firm and market characteristics. This confusion reflects the intimate relationship between firm and market structure in the construction industry. Variability, Stinchcombe's key explanatory variable, can be linked to both bureaucratization, a firm characteristic, and subcontracting, a firm-market interface characteristic that contributes to market structure. One then expects a relationship between subcontracting and bureaucratization, a negative one, since subcontracting, like craft socialization, is an alternative to bureaucratic administration.

Variability, however, is not correlated with subcontracting. Rather, subcontracting can be explained as a response to uncertainty, which arises from complexity (as well as variability). Furthermore, variability is not strongly linked to bureaucratization. But bureaucratization can be empirically demonstrated to be correlated with subcontracting, largely because of the mutual positive correlations with market extent. The market extent and the size and complexity of a project are important explanatory variables for subcontracting. The production functions of general contractors and subcontractors are aspects of market structure, as are the number and size of firms. These

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aspects provide a better explanation of the data used by Stinchcombe and, together with other evidence, raise doubts about his interpretation. Even by his criteria and measures, construction firms are more bureaucratic than he recognized.

OVERVIEW OF CONSTRUCTION INDUSTRY

Market Structure

The term "construction" covers the erection, maintenance, and repair of immobile structures, the demolition of existing structures, and land development. One of the most striking features of construction is the large number of firms. In 1972 there were 920,806 construction firms,[1] although the term "firm" is used very loosely. About 52 percent of these firms were individuals who were working for themselves as proprietors or as incorporated businesses without any employees and who did not have an employment contract with other firms. Of the firms with at least one employee, many were very small.

Table 1

Percentage Distribution of Construction Firms by Size in Number of Employees by Type of Contractor and Manufacturing, 1972*

	Type of Contractor			
Number of employees	General building	Heavy and highway	Special trade	Manufacturing
None	39.8	38.3	61.9	7.8
1–4	37.3	25.3	22.8	33.3
5–9	11.8	11.2	7.7	16.5
10–19	6.1	9.5	4.4	14.6
20–49	3.5	8.9	2.4	15.1
50–99	1.0	3.7	0.6	6.4
100–249	0.4	2.2	0.2	3.8
250 and over	0.2	1.0	†	2.5
Average, all firms	5.7	21.3	3.3	79.7
Average, all firms having employees	9.5	34.5	8.6	86.4

*Source: U.S. Bureau of the Census (1977: 59–60, 144–149).
†Less than .1.

The term "construction industry" refers to three 2-digit S.I.C. industry classifications: general building contractors, heavy and highway general contractors, and special trade contractors. These types are differentiated in terms of type of construction and role in the production process, as indicated in Tables 3 and 5. General building contractors build residential buildings, industrial buildings and warehouses, and other types of nonresidential buildings such as offices, schools, stores, restaurants, hospitals, and churches. Heavy and highway contractors perform all nonbuilding construction, such as highways and other transportation structures, various pipelines, communication and power lines, dams, harbor and port and military facilities. Special trade contractors contract for plumbing and heating, painting, electrical work, masonry, plastering, roofing, and structural steel erection. Both types of general contractors are responsible for the entire project. They typically are under contract with the owner to complete the project for a fixed sum of money or a fixed price per unit of work, sometimes with cost and time incentives. They do not, however, directly hire all the labor trades needed for a project. General building contractors in

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[1] Unless otherwise noted, data are from U.S. Bureau of the Census (1975e).

1972 paid 46.3 percent of their construction receipts (volume) to special trade subcontractors; heavy and highway general contractors paid out 15.9 percent, and special trade contractors paid out 6.5 percent. Special trade contractors are commonly subcontractors to the general and heavy contractors, furnishing a particular set of labor skills. General building contractors, who typically hire carpenters, laborers, and sometimes painters and bricklayers directly, subcontract for the other trades. Heavy and highway contractors, who require fewer types of trades, typically hire operating engineers, laborers, and asphalt workers, subcontracting the rest.

Other important characteristics of construction are:

1. *Small degree of diversification by construction firms.* Construction firms obtained 97 percent of their business receipts from construction activity in 1972.

2. *Geographically limited markets.* Immobility of structures necessitates local, on-site production; 93 percent of the construction firms worked in only one state. Obviously the geographical boundaries of the market for a firm can be less than statewide, depending on the density of construction, activity, and size of the state.

3. *Ease of entry.* The large number of firms, many very small, indicates that entry into construction is easy for someone with the necessary skills. Capital requirements for fixed assets are small.

4. *Lack of concentration.* Typical measures of concentration, such as the percentage of an industry's sales accounted for by the top four or eight firms, are almost meaningless in the construction industry. While a relatively small percentage of firms accounts for a large percentage of volume, the nature of this relationship is very different from the typical manufacturing industry, which has a much smaller number of firms. For example, of the construction firms with at least one employee or partner, 3,863 (.9 percent) had business receipts of $5,000,000 or more and accounted for 32.7 percent of total industry receipts. In contrast, Scherer (1970: 55), reporting data on concentration ratios and number of firms for some representative industries, found that many of these industries (4-digit classification codes) have fewer than 1,000 firms, with the largest four firms having between 30 percent and 95 percent of the industry volume.

Subcontracting

Subcontracting in the construction industry is a response to uncertainty arising from complexity, given bounded rationality of the firm (Williamson, 1975). It is not a response to seasonal variability, as argued by Stinchcombe. Construction technology is intensive, requiring a project management form of organization to cope with the complexity and uncertainty of the technology and with the requirements for adaptability (Thompson, 1967: 17–30). Typically, general building and heavy and highway contractors submit competitive bids to the owner for projects whose specifications are determined by the owner with the assistance of architects and engineers. These specifications (design, performance requirements, and even construction methods) largely determine the types of labor skills needed and the amount and timing of their application. Competitive bidding, owner-determined specifications, on-site production, and custom building introduce a high degree of uncertainty and make it difficult for general contractors to plan future labor requirements. Equally difficult is the balancing of components problems (Thompson, 1967: 45). A general contractor cannot keep a large number of labor specialties, with constant capacity per specialty, productively occupied because of the great uncertainty about labor requirements by specialty, by time period, and by location and because of the difficulty of transferring workers from widely separated jobs.

The general contractor has two extreme responses: continual hiring and firing workers, as they are needed in all of the trades, or subcontracting. The first assumes that workers would be available when needed. It also introduces transaction costs (Williamson, 1975) and places a significant burden on the administration for coordinating all of the various labor specialties. The extent of this difficulty can be seen from Table 2, which reports data from eleven surveys of the Bureau of Labor Statistics. These data show that there is substantial variation in labor requirements as well as in distribution of a given type of labor over the course of the project. Many trades make up only a very small proportion of total labor requirements. Carpenters and laborers, the trades typically employed directly by general building contractors, make up 41.4 percent of the average total

Table 2

Percentage Distribution of On-Site Worker Hours and Variation Over Time*

Type of Worker	On-Site Worker Hours (%) Minimum	Maximum	Average	S.D. of time distribution†
Laborer	15.3	26.2	22.5	4.06
Carpenter	12.6	34.7	18.9	4.54
Plumber	5.6	15.6	10.0	5.23
Bricklayer	5.0	10.0	6.9	10.14
Electrician	2.8	9.9	6.8	5.87
Helper and tender	4.7	8.3	6.4	8.20
Painter	2.1	9.7	4.0	13.59
Sheetmetal worker	1.0	5.5	3.1	7.89
Cement finisher	1.4	4.2	2.4	5.53
Plasterer	1.0	3.6	2.1	13.34
Operating engineer	1.4	2.9	2.1	4.86
Lather	.6	3.2	1.9	10.91
Reinforcing iron worker	.6	2.4	1.1	9.00
Tile setter and terrazzo worker	.2	1.9	1.1	14.70
Structural iron worker	.2	1.7	1.0	8.38
Roofer	.6	1.5	1.0	10.11
Asbestos worker	.0	2.1	.9	8.86
Ornamental iron worker	.5	1.1	.7	9.80
Soft floor layer	.0	1.4	.6	17.05
Glazier	.0	.8	.4	11.71
Elevator mechanic	.0	.9	.4	9.75

*U.S. Bureau of Labor Statistics (1961, 1962a, 1962b, 1964a, 1964b, 1965, 1968, 1971, 1976). Based on data from nine building types (two types at two times) constructed between 1959 and 1971, from a sample of 636 projects.

†Standard deviation of percentage distribution of hours by one-tenth of construction time. The Pearson correlation coefficient of average percentage of on-site hours and standard deviation of time distribution is −.582 with $p=.003$.

requirements; the balance is distributed over 19 other trades. These data are normalized, both in terms of absolute hours of labor and length of construction time.

Special trade contractors provide an alternative to hiring and firing workers. They serve as resource pools for the general contractors and are responsible for recruiting, training (especially in nonunion construction), allocating, and controlling labor resources. Typically they work for a number of general contractors, sometimes on several projects for a given general contractor, and so attempt to keep their work force somewhat stable and productively occupied. By taking fixed-price subcontracts from the general contractor, sometimes with various incentives, they absorb much of the uncertainty and risk faced by the general contractor.

Since characteristics of construction technology require labor specialization but also result in component balancing problems of labor specialties, general contractors, in conditions of bounded rationality, rely on subcontractors to obtain the required skills without becoming overwhelmed by uncertainty resulting from complexity. The greater the specialization in number of distinct skills and tasks, the greater the complexity and uncertainty, and the greater the use of subcontractors, as indicated in the following progressions:

$$\text{Specialization} \xrightarrow{+} \text{Complexity} \xrightarrow{+} \text{Uncertainty} \xrightarrow{+} \text{Subcontracting}$$

Hypotheses

If variables can be identified that cause increased specialization, they should also be positively related to the amount of subcontracting. Three obvious variables are type and size of project and extent of the market.

Specialization is due to at least two factors: skill and efficiency. Some tasks require a high degree of skill, as in the mechanical trades, e.g., plumbing, electrical work. For workers to learn these skills, they must make an investment in training, which may have to be updated periodically. As a result, they specialize in performing these tasks, both because they receive economic remuneration that presumably reflects the high skill required and because only those having these skills can perform these tasks. Specialization can also result from the labor efficiencies effected when a person performs a simple task repetitively. This classic notion of assembly-line production can be extended to construction. The fundamental task of carpentering can be subdivided into framing, siding, roofing, finish carpentry, and even more. Because of labor efficiencies, specialists can be more cost effective than a jack-of-all-trades. The degree to which specialization is important depends upon cost constraints and the supply of specialists.

Specialization in construction is dependent upon the type and size of the project. Type of project refers to the production requirements; for example, buildings that must perform either a variety of functions or some highly specialized functions will require many high-skill specialties in their construction. The number of uses, the amount and types of equipment used and installed, the materials used, and the interior finish all affect the number of specialties required. Buildings of a given level of complexity can vary in size, and increasing size often means increasing complexity. The larger the building the greater the opportunity for applying the principles of task simplification to achieve labor efficiencies. On very, very large projects this specialization can approach the refinement found in manufacturing assembly lines.

Stigler's (1951) thesis on the division of labor among firms increasing with increasing market extent also applies. By Stigler's thesis, a sufficiently large market is required before some task specialties can be performed by independent firms to achieve economies of scale.

Thus, three hypotheses can be derived relative to the amount of subcontracting:

Hypothesis 1. The more complex the type of construction, the greater the amount of subcontracting.

Hypothesis 2. The larger the project, the greater the amount of subcontracting.

Hypothesis 3. The more extensive the market, the greater the amount of subcontracting.

Tests of Hypotheses 1, 2, 3

These three hypotheses can be tested with data from the *1972 Census of Construction Industries* (U.S. Bureau of the Census, 1975a). Data are reported for firms of different types, sizes, and from different states. Because only aggregate totals for a category are available, the unit of analysis is a statistically constructed "average" firm used to represent the entire category. The emphasis will be on testing the hypotheses as they apply to the two types of general contractors, although the hypotheses also apply to special trade contractors.

Hypothesis 1 can be tested with data from firms, since firms specialize by type of construction. General contractors of both types can be divided into narrower types according to type of construction.[2] Table 3 reports data on firms that specialize, showing amount of specialization and subcontracting expenditures. Although the census does not report data that could be used as an independent indicator of complexity for each type of construction, firms specializing in more complex projects do more subcontracting. Complexity is in part determined by the number of functions performed by the structure. For example, hospitals must have operating rooms, laboratories, bedrooms, and kitchens, just to name a few; and they require specialized equipment and stringent performance requirements, such as temperature and humidity controls. Firms specializing in this type of building subcontract more than those building simpler structures, such as religious buildings or highways. The classifications shown in Table 3 are still relatively broad, e.g., warehouses are usually simpler structures than industrial buildings, but they do provide some confirmation of hypothesis 1.

Hypothesis 2 can be examined for all three types of construction firms. Subcontracting expenditures are reported for firms in various size ranges, where size is measured both by number of employees and total receipts in dollars. The reasons for using the dollar measure are: (1) it is reasonable to assume that large firms have large projects, and that larger projects require more labor and materials and are more costly. Also, (2) subcontracting expenditures and firm size measured by number of employees are correlated; for a fixed volume of work, firms subcontracting

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[2] At least when measured for a single year (1972) there is intensive specialization—91 percent of general building contractors and 92.6 percent of heavy and highway contractors. Even special trade contractors specialize in types of construction. Of the 17 categories of special trade contractors, percent specializing ranges from 60.2 percent to 96.9 percent and percent of construction receipts in specialty ranges from 79.2 percent to 96.6 percent.

Table 3

Amount of Subcontracting by Specialized Firms*

Types of Construction	Amount of specialization† (%)	Amount subcontracted‡ (%)
General building contractors		
Office and bank buildings	.800	.610
Operative builders — other residential	.883	.608
Hospital and institutional buildings	.720	.596
Educational buildings	.759	.573
Multifamily residential buildings	.855	.540
Other residential buildings	.769	.537
Stores, restaurants, public garages, and auto service stations	.837	.513
Amusement, social, recreational buildings	.857	.484
Religious buildings	.778	.444
Industrial buildings, warehouses	.809	.431
Single-family houses	.933	.367
Farm buildings	.861	.083
Heavy and highway contractors		
Mass transit construction	.942	.302
Sewage treatment and water treatment plants, related facilities	.842	.239
Bridges, elevated highways	.844	.234
Heavy industrial facilities	.907	.209
Dam and reservoir construction	.864	.202
Power plants	.931	.200
Highways, streets	.875	.186
Tunnels	.938	.112
Parking lot construction	.756	.104
Sewers, water mains, related facilities	.910	.100
Harbor and port facilities	.795	.100
Power and communication transmission lines, towers, related facilities	.914	.096
Marine construction	.896	.092
Pipeline construction (gas, petroleum, etc.)	.907	.089
Conservation and development construction	.876	.084

*Source: U.S. Bureau of the Census (1975b: 22–31). Firms having 51% or more of construction receipts in specialty.
†Ratio of construction receipts in specialty to total construction receipts.
‡Subcontracting expenditures as a ratio of construction total receipts.

more work have fewer employees. But construction firms do not use subcontracting as a means of increasing dollar volume for a fixed number of employees. Volume of a firm is determined by market forces, financial constraints, and administrative limitations on the number of projects that can be managed. Subcontracting expenditures are more a resultant than a determinant of dollar volume, which justifies treating the latter as the independent variable and the former as the dependent variable. The Pearson correlation coefficients for average firm size and subcontracting expenditures in the size ranges for which data are reported are: general building contractors (p = .793; sig.≤ .009; N = 8), heavy and highway contractors (p = .840; sig.≤ .005; N = 8), and special trade contractors (p = .885; sig.≤ .001; N = 10). For all three basic types, the correlations are high and significant, although the Ns are small. The ranges in subcontracting expenditures are 24.0–56.3 percent for general building contractors, 5.8–20 percent for heavy and highway contractors, and 2.8–11.5 percent for special trade contractors.

Hypothesis 3 can be tested with census data available on a state-by-state basis for eight subtypes of general building and heavy and highway contractors (Table 4). Subcontracting expenditures were computed for the statistical average firm in each state. Market extent was taken to be indicated by urbani-

Table 4

Correlations of Market Extent* and Subcontracting† by Type of Contractor

Type of Contractor	Pearson Correlation Coefficient
General building	
Single-family houses and operative builders ($N=50$)	.677•
Residential buildings other than single-family ($N=48$)	.693•
Industrial buildings and warehouses ($N=50$)	.690•
Nonresidential buildings, N.E.C.‡ ($N=50$)	.585•
Heavy and highway	
Highway and street construction ($N=49$)	.163
Bridge, tunnel, and elevated highway construction ($N=33$)	.415••
Water, sewer, and utility lines ($N=42$)	.297•••
Heavy construction, N.E.C.‡ ($N=44$)	.359•••

•$p \leq .05$; ••$p \leq .01$; •••$p \leq .001$

*Percentage of population living in a SMSA, April 1970.
Source: U.S. Bureau of the Census (1975b).

†Subcontracting expenditures as a proportion of construction receipts.
Source: U.S. Bureau of the Census (1975a).

‡Not elsewhere classified.

zation, measured as percentage of population living in Standard Metropolitan Statistical Areas (SMSAs) in 1970. Greater urban density concentrates construction activity around urban centers, resulting in more extensive markets, given the on-site, local nature of construction. An analysis of variance showed that these eight subtypes differed in subcontracting expenditures ($F = 168.89$), bureaucratization ($F = 11.69$), and variability ($F = 12.30$) at the .001 level, supporting the position that differences in type of construction result in differences in characteristics of the firm. For seven of the eight subtypes, the correlation coefficient, ranging from .297 to .693, is significant at the .05 level or better. Market extent is, therefore, strongly correlated with subcontracting, and hypothesis 3 is supported. The correlations are highest for the four types of general building contractors, who subcontract largest amounts of their work (Table 5), as would be expected given their role in the production process and the types of building projects managed. Although these data are limited, they are consistent with three hypothesized relationships of subcontracting to complexity, size, and market extent.

REVIEW OF STINCHCOMBE'S THESIS

Stinchcombe (1959) stated that bureaucratic administration implies having the planning of the work process centralized in the administrative component of the firm and that it is further characterized by a finely adjusted and stable communications structure and a high proportion of continuously functioning clerks. Construction is subject to such variability in the volume of work and the product mix that bureaucratic administration is uneconomical. Stinchcombe cited seasonality, the business cycle, and limited geographical radii for most construction firms as the main causes of this variability (1959: 179). He further stated (1959: 169) that craft administration is the type found in construction and that this substitutes professional training of the work force, i.e., craft socialization, for bureaucratic administration. Decisions about the product and the work process, instead of being made by administrators who are not part of the work crew, "are governed by the workers in accordance with the empirical lore that makes up craft principles" (1959: 170). Construction firms have simpler administrative structures than manufacturing firms, with fewer clerks and professionals and with simpler communications systems.

Criteria of Bureaucratic Administration

In developing his interpretation that craft administration is a type of rational administration that differs from bureaucratic administration, Stinchcombe characterized bureaucratic administration in terms of six criteria drawn from Weber.[3] He quoted five criteria directly and a sixth he paraphrased. Three of these, he stated, apply to the construction industry (Stinchcombe, 1959: 183):

Criterion 1. "The duties in construction are 'distributed in a fixed way as official duties.' "

Criterion 2. "Craft production . . . does involve 'the principle of fixed and official jurisdictional areas, which are generally ordered by rules.' "

Criterion 3. "The authority to give the commands required for the discharge of these duties is distributed in a stable way."

Three other bureaucratic criteria do not apply to construction (Stinchcombe, 1959: 184):

Criterion 4. "Methodical provision is made for the *regular and continuous* fulfillment of these duties and for the execution of the corresponding rights" (italics Stinchcombe's).

Criterion 5. "The principles of office hierarchy . . . in which there is supervision of the lower office by the higher ones."

Criterion 6. "The other main criterion Weber proposes concerns the stable structuring of communications (files), which we have taken as the empirical indicator of stable, rule-governed communication channels among official statuses."

A careful reading of Weber (1946) shows that Stinchcombe's interpretation of his writing is questionable on a number of points (Eccles, 1979). Weber did not place the same emphasis on regular and continuous fulfillment of duties as Stinchcombe; nor did he equate files with the stable structuring of communications.

Hypotheses

Stinchcombe stated that the relative size of the administration (managers, professionals, and clerical/workers or clerks) is the same for construction and manufacturing (1959: 171), despite his theory that craft administration characterized construction firms. However, the 1970 census data for the three occupational categories constituting administration are 20.3 percent in construction and 27.6 percent in manufacturing. The corresponding 1950 data that Stinchcombe used are 15.5 percent for construction and 20.6 percent for manufacturing. Moreover, he stated that construction uses fewer clerks than manufacturing, because "administrations faced with the critical problems of instability and flexibility, such as those in the construction industry, will not find it economical to teach clerks rules for channeling communications" (1959: 177). Yet, if the administrative component is of the same total size but has fewer clerks, then it must have more professionals and/or managers, which

[3] Stinchcombe's interpretation of Weber was taken from a translation of Weber's work (1946).

makes for a more, not less, expensive administrative component.

Stinchcombe used two measures as indicators of bureaucratic administration: percentage of administrative positions held by clerks and the percentage of nonclerical, i.e., professional and managerial, positions. These two measures are more or less continuous variables, yet Stinchcombe used them to make a dichotomy, bureaucratic *versus* craft administration, without indicating the cut-off points.

Stinchcombe did not directly address the relationship between variability and craft socialization, which is a crucial omission, since it must be shown how craft socialization, which makes craft administration possible, is a consequence of variability. Yet he presented empirical data supporting his interpretation of the relationships between variability and bureaucratization (1959: 178). Noting that the larger the index of seasonality (variations due to weather, with variations due to demand cycles factored out), the smaller the percentage of clerks in the labor force, Stinchcombe concluded that "the strength of the relationship within the industry can give us confidence in asserting that instability decreases bureaucratization" (1959: 179). Thus, the following hypothesis can be formulated from Stinchcombe's theory:

Hypothesis 4. The greater the variability, the smaller the degree of bureaucratization.

One of the most interesting confusions in Stinchcombe's paper is his confounding firm-level properties with market-level properties. Stinchcombe's argument for the existence of a fixed distribution of duties (criterion 1) is based on contracts between the client and general contractor and between general and subcontractors. This ignores the allocation of duties within the administration of the construction firm. Fixed and official jurisdictional areas (criterion 2), he said, are established through the jurisdictional provisions of trade unions, the introductory sections of collective contracts, and through the state licensing laws for contractors. But these reasons failed to address the allocation of jurisdictional areas within the administration of a single firm.

Stinchcombe saw the stable distribution of authority (criterion 3) in the "stable sanctions available" to general and subcontractors, especially the right to dismiss workers. This led him astray on the principles of office hierarchy (criterion 5); because he focused on communications among firms, he stated that office hierarchy does not exist in construction. But construction does have an administrative hierarchy of legitimated commands, from general manager to division manager to project manager to job superintendent to foreman to worker.

His ideas about communications (that is, his criterion relating to files) have a similar weakness (1959: 173-175):

> In the construction industry, authoritative communications from administrative centers carry only specifications of the product desired and prices (and sometimes rough schedules). These two elements of the communication are contained in the contract; first, the contract between the client (with the advice of architects or engineers) and the general contractor, and second, between the general contractor and subcontractors.

Because these subcontracts are renegotiated for every project, he stated that stable structuring of communications does not exist.

For his most important criterion, criterion 4, on the regular and continuous fulfillment of duties, Stinchcombe again used subcontracting. He thus substituted an interfirm for an intrafirm explanation (1959: 185):

> Authorities on a construction project are appointed by subcontractors only for the duration of the project. The basis of responsibility for leadership duties is the contract for specific work (and the contractors' reputations) rather than generalized loyalty to the administration.

Since these authorities fulfill project duties to the general contractor for limited duration, he thought that continuous fulfillment of duties does not exist.

This confusion between firm and market level properties is most significant in his confounding of subcontracting and craft socialization. He quoted Maisel (1953), on the advantages of subcontracting, to take issue with those engaged in "a good deal of careless talk about the bureaucratization of construction and the introduction of mass production by operative building of tract homes" (Stinchcombe, 1959: 181). Thus, he considered that subcontracting was evidence of a lack of bureaucratization. He noted in a diagram (1959: 174) that some trades were performed by subcontractors and some by the general contractor through directly employed craftsmen, but he did not identify the factors surrounding the integration-subcontracting decision.

It is possible that this confusion is actually illuminating and that subcontracting is actually the key variable. Subcontracting may be a response to variability that mediates between variability and bureaucratization as follows:

$$\text{Variability} \xrightarrow{+} \text{Subcontracting} \xrightarrow{+} \text{Bureaucratization}$$

where increased subcontracting results in decreased bureaucratization. Two more hypotheses can be formulated from this interpretation of Stinchcombe's theory.

Hypothesis 5. The greater the variability, the greater the degree of subcontracting.

Hypothesis 6. The greater the degree of subcontracting, the smaller the degree of bureaucratization.

Tests of Hypotheses 4, 5, 6

In support of hypothesis 4, Stinchcombe offered data on seasonality and percentage of clerks in the labor force for nine types of contractors. More recent and similar data are available for 25 types of contractors (Table 5). Data on percentage of clerks in the labor force are not available, but the table gives the percentage of nonproduction employees. In some ways, proportionate size of the administration is a better index of bureaucratization. It is certainly more consistent with Stinchcombe's claim that variability creates fixed overhead problems and thus the need for less bureaucratization. The variability measure used was the month of greatest employment of construction workers divided by the month of lowest employment. Data are reported for March, May, August, and November. The Pearson correlation coefficient between this

Table 5

Variability, Bureaucratization, and Subcontracting by Type of Construction Firm

Type of Construction Firm	Variability*	Bureaucratization† (%)	Subcontracting‡ (%)
General building contractors and operative builders			
Single-family houses, operative	1.247	.221	.384
Residential buildings other than single-family	1.258	.160	.527
Industrial buildings, warehouses	1.204	.165	.435
Nonresidential buildings, N.E.C.	1.211	.158	.532
Heavy and highway			
Highway and street	1.788	.122	.183
Bridge, tunnel, elevated highway	1.356	.118	.203
Water, sewer, and utility lines	1.328	.122	.096
Heavy construction, N.E.C.	1.135	.184	.189
Special trade			
Plumbing, heating, air conditioning	1.124	.186	.113
Painting, paper hanging, decorating	1.385	.079	.039
Electrical work	1.135	.162	.023
Masonry, stonesetting, other stone work	1.231	.055	.035
Plastering, drywall, insulation work	1.126	.109	.060
Terrazzo, tile, marble and mosaic work	1.102	.138	.026
Carpentering	1.234	.068	.086
Floor laying, other floor work	1.124	.183	.037
Roofing and sheet metal work	1.228	.151	.048
Concrete work	1.497	.087	.054
Water well drilling	1.163	.148	.021
Structural steel erection	1.155	.140	.050
Glass and glazing work	1.128	.297	.015
Excavating and foundation work	1.345	.117	.079
Wrecking and demolition work	1.162	.169	.076
Installing building equipment, N.E.C.	1.334	.204	.042
Special trade contractors, N.E.C.	1.296	.182	.072

*Month of highest employment divided by month of lowest employment of construction workers for the months of March, May, August, and November. Source: U.S. Bureau of the Census (1975a).

†Proportion of nonproduction workers. Source: U.S. Bureau of the Census (1975a: Table B1).

‡Subcontracting expenditures as a proportion of construction receipts. Source: U.S. Bureau of Census (1975a).

admittedly crude measure and Stinchcombe's more sophisticated measure of variability is .998, significant at the .001 level. Degree of subcontracting was measured as the ratio of construction receipts paid to subcontractors.

Correlations for all three hypotheses are: (1) for variability and bureaucratization, $p = .355$ (sig. = .04); (2) for variability and subcontracting, $p = .077$ (sig. = .358); and (3) for subcontracting and bureaucratization, $p = .154$ (sig. = .232). Only hypothesis 4 has a statistically significant correlation, a fairly low −.355. However, this relationship is largely spurious and ignores important technological effects. Contractors with smaller bureaucratization measures tend to have production processes that are simpler to manage in terms of input requirements (purchasing and estimating) and on-the-job coordination, e.g., concrete work, carpentry, masonry, and painting, but they also face more variable workload conditions. Some types of contractors with higher bureaucratization measures also face less variable conditions; however, their larger administrative components are due to requirements for more complex production management, for example, plumbing and heating, and the sheet metal subset of roofing and sheet metal firms, both of which involve assembly of parts and components. The greater number of parts and equipment used in plumbing and heating firms is equivalent to the extensive ship fabrication required in sheet metal firms. Thus, both require larger administrative components than firms that work on applying materials on building structures with homogeneous materials like those who do masonry, stonework, drywall, and plastering. Although seasonality does have some effect on bureaucratization, there is also a very strong technological effect.

A better test of hypothesis 4 would be to examine specific types of construction firms, thus controlling for technology and role in the production process (Table 6). This can be done for the eight types of general construction firms by using census data reported on a state-by-state basis, as was done to test hypothesis 3. Each state also has a measure on variability, as defined above in terms of high and low employment of construction workers, for each subtype and a measure of market extent. A confirmation of the variability measure reflecting the influence of climate on workload volume is that it has a Pearson correlation coefficient of .694 (p = .001) with average annual inches of snow and sleet for selected cities in each state.[4]

Table 6, column 2, reports the results. For only two types of firms is there a statistically significant relationship between variability and bureaucratization. However market extent has a small negative relationship with variability. This could be due to greater stability of construction activity in more extensive markets or it could be spurious, due to a negative relationship between favorable climates for year-round construction and urbanization. In any case, when market extent is controlled for, variability has a statistically significant relationship in the predicted direction for only one type of firm and statistically significant relationships in the opposite direction for two types

Table 6

Correlations with Market Extent and Variability for General Contractors

General Contractors	Market extent* & subcontracting†	Variability‡ & bureaucratization§	Variability & subcontracting	Bureaucratization & subcontracting	Market extent & bureaucratization	Market extent & variability	Partial Correlations Controlling for Market Extent: Variability & bureaucratization	Variability & subcontracting	Bureaucratization & subcontracting
General building									
Single-family houses and operative builders (N=50)	.677•••	–.506•••	–.209	.667•••	.704•••	–.351••	–.389••	.042	.365••
Residential buildings other than single-family (N=48)	.693•••	–.369•••	–.490•••	.544•••	.460•••	–.347••	–.230	–.384••	.366••
Industrial buildings and warehouses (N=50)	.690•••	.102	–.176	.422•••	.480•••	–.222	.243••	–.033	.144
Nonresidential buildings, N.E.C.‖ (N=50)	.585•••	–.027	–.383•••	.319••	.536•••	–.386•••	.231	–.210	.008
Heavy and highway									
Highway and street (N=49)	.163	.150	–.280•	–.060	.514•••	–.276•	.354••	–.248•	–.170
Bridge, tunnel, elevated highway (N=33)	.415••	–.130	–.173	.265	.222	–.158	–.099	–.108	.205
Water, sewer, utility lines (N=42)	.297•	–.082	.055	.447••	.477•••	–.172	–.015	.045	.360••
Heavy construction, N.E.C.‖ (N=44)	.359••	.077	.002	.010	.394••	–.496•••	.263•	.210	–.175

•$p \leq .05$; ••$p \leq .01$; •••$p \leq .001$

*Percentage of population living in a SMSA, April 1970 (U.S. Bureau of the Census, 1975c: 18).

†Subcontracting expenditures as a proportion of construction receipts (U.S. Bureau of the Census, 1975a).

‡Month of highest employment/month of lowest employment of construction workers for the months of March, May, August, and November (U.S. Bureau of the Census, 1975a).

§Proportion of nonproduction workers (U.S. Bureau of the Census, 1975a: Table B1).

‖Not elsewhere classified.

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[4] Data are from U.S. Bureau of the Census (1975b).

of firms (Table 6, Column 7). There is no strong relationship between variability and bureaucratization.

Hypothesis 5 does not receive any statistical support. This is not surprising when market structure relationships between general contractors and special trade contractors are recognized. By virtue of their role in the production process, general contractors have much greater subcontracting expenditures. There is no reason to expect a correlation between variability and the factors leading to subcontracting discussed earlier.

It is still possible that when type of contractor is held constant, to control for technological differences and role in the production process, there would be a relationship between variability and subcontracting. Table 6, Column 3, shows that the relationship between variability and subcontracting is significant at the .05 level or better in three cases, but in the opposite direction from that predicted by Stinchcombe's theory; therefore, market extent is much more highly correlated with subcontracting. Even when market extent is controlled for, only two statistically significant relationships are found between variability and subcontracting, still in the opposite direction. Variability, therefore, does not promote subcontracting.

Hypothesis 6 also receives no statistical support for the 25 types of construction firms (Table 5). However, of the eight types of general contractors, five have a statistically significant correlation between bureaucratization and subcontracting (Table 6, Column 4), but again in the opposite direction from that predicted by Stinchcombe's theory. To some extent, this relationship is a result of the positive correlations that both variables have with market extent, which is positively related to bureaucratization at the .001 level in six cases and the .01 level in one case. Greater complexity in more extensive markets results in greater labor specialization of both the general contractor's own work force and the subcontractors used. Both result in increased coordination requirements and, thus, increased bureaucratization. Moreover, even when market extent is controlled for, three of the eight types of general construction firms have a statistically significant positive relationship between bureaucratization and subcontracting (Table 6, Column 9). Subcontracting is clearly not a substitute for bureaucratization. The data in Tables 5 and 6 clearly do not confirm the hypotheses derived from Stinchcombe's theory.

ADMINISTRATIVE COMPONENT IN THE CONSTRUCTION FIRM

Work Process Planning

The relationship between variability and bureaucratization that Stinchcombe offered as confirmation of his theory was based on limited data and was applied to various types of construction firms. Yet his initial empirical demonstration of the difference between bureaucratic and craft administration was based on a comparative analysis between construction and manufacturing. It is still possible that the administrative component differs in important ways in construction and manufacturing firms. This is clearly an important question and one best addressed through comparative case studies. However, it is possible here to review Stinchcombe's interpretation by using a more recent and more extensive set of data than that used by Stinchcombe.

Stinchcombe's idea (1959: 170) of simpler administrative structures in construction firms was based on members of the work crew making five critical work process decisions: (1) the location at which a particular task is performed, (2) the movement of tools, materials, and workers to this location and its most effective arrangement, (3) at times, the particular movements required to perform the task, (4) the scheduling of particular operations, and, finally, (5) the inspection criteria for particular operations (1959: 170). Workers are able to perform these tasks as a result of their craft socialization, whereas, in manufacturing firms, these tasks are performed by administrators. Although construction workers may make these various decisions, this is certainly not always the case.

The first three work process decisions are project planning, scheduling, and control, activities that are not located at the production level. Clough (1972: 3–8), for example, drew a strong distinction between office and field administration but maintained that central administrators could perform field administration through such techniques as PERTs and CPMs. Seldin and Bloom (1961: 28) gave evidence that in construction, planning, scheduling, and control are performed by administrators. Gill (1968) proposed that administrators establish detailed schedules of daily operations and manpower allocations by operation.

The last two work process decisions, which are supervisory activities, are the least susceptible to administrative overview in construction. They are clearly the responsibility of the job superintendent (Evans and Emery, 1978: 24, 33; Evans and Smolkin, 1974: 66); however, even though located at the project site, the supervisor is considered part of the administration when not physically working. Work process planning is therefore part of the administrative component in construction.

Impact of Market Structure on Administration

Stinchcombe used craft administration to account for observed differences in occupational distribution between construction and manufacturing census data. These patterns of distribution can be explained, however, by the following factors: (1) the role of the firm in the construction process, (2) classification problems in the census between craftsmen and administrators and between self-employed individuals and one-person "firms," and (3) the size of the firm, measured by average number of employees, coupled with unit-of-analysis classification problems. The first and third are aspects of market structure; the second factor is a technical one but related to the other two. Furthermore, although Stinchcombe compared construction in the aggregate with manufacturing, here the three main types of construction are considered separately. Stinchcombe's theory does not explain differences among these more restrictive types adequately. (The comparisons that follow between construction and manufacturing are based on the data from the U.S. Bureau of the Census [1972, 1975a]).

Table 7 illustrates Stinchcombe's major points on the differences between bureaucratic and craft administration:

1. The relative size of the total administration is roughly the same — 20.3 percent for construction and 27.6 percent for manufacturing.

Table 7

Percentage Distribution of Three Administrative Categories, by Manufacturing, Total Construction, and Type of Contractor, 1970*

Administrative categories	Manufacturing	Total construction	Type of Contractor General building	 Special trade	 Heavy and highway
Total employed	100.0	100.0	100.0	100.0	100.0
Total administration	27.6	20.3	25.0	15.0	27.3
	(100.0)†	(100.0)	(100.0)	(100.0)	(100.0)
Professional, technical, and kindred	9.9	4.5	2.8	1.6	12.3
	(35.9)	(22.2)	(11.2)	(10.7)	(45.1)
Managers and administrators	5.2	9.5	16.3	7.4	7.6
	(18.8)	(46.8)	(65.2)	(49.3)	(27.8)
Clerical and kindred	12.5	6.3	5.9	6.0	7.4
	(45.3)	(31.0)	(23.6)	(40.0)	(27.1)
Professionalization index‡	65.6	32.1	14.7	7.8	61.8

*Source: U.S. Bureau of the Census (1972: 249–264).
†Numbers in parentheses are the percentage of total administration.
‡Index=Professionals, etc./(professionals and managers).

2. The occupational category "clerical and kindred" (here clerks) is a larger proportion of the administration in manufacturing (45.3 percent) than in construction (31.0 percent).

3. The proportion of "top administration" positions, i.e., professionals and managers, accounted for by professionals is higher in manufacturing (65.6 percent) than in construction (32.1 percent). These data are also consistent with the data reported by Stinchcombe from the 1950 census. For "clerical and kindred," manufacturing was 53 percent and construction 31.0 percent. Professionals held 50 percent of the top administrative positions in manufacturing firms and 31 percent in construction firms.

However, if these data are considered for the three basic types of construction firms (Table 7), variations are found that are not explained by Stinchcombe's thesis about craft administration:

1. Special trade contractors have a relatively smaller total administration. Yet Stinchcombe's argument did not account for differences in relative size of this component, since he thought they were roughly equal.

2. Special trade contractors have almost the same proportion of clerks (40 percent) as manufacturing companies (45.3 percent).

3. The proportion of positions held by "managers and administrators" is higher for general building contractors (65.2 percent) and special trade contractors (49.3 percent) than for heavy and highway contractors (27.8 percent) and lowest for manufacturing (18.8 percent).

4. The professionalization-of-authority index is nearly equal for heavy and highway contractors and manufacturing, 61.8 percent versus 65.6 percent, and is much lower for general building contractors and special trade contractors (14.7 percent and 7.8 percent, respectively).

Classification Problems. The relatively smaller administrative component of special trade contractors is probably due to classification problems in the census: Is a self-employed craftsman, operating as a proprietor with no employees (or maybe one or two employees), a craftsman, a manager of a one-person firm, or both? If proprietors of one-person firms are classified as craftsmen, then there is a downward bias in aggregate statistics used to measure relative sizes of firm components, in this case, administration versus production.

Another problem is the unit of classification in the census. A self-employed person may be performing production, managerial, professional, and clerical functions, yet is listed in only one occupational classification. Similarly, a foreman (first-level management) or job superintendent (second-level management) may be classified as a craftsman, especially since most foremen and superintendents are former craftsmen. Stinchcombe did not take into account that a person might take part in both production and administration, which is especially likely in very small firms.

In an industry with a large number of one-person (or few-person) firms, aggregated occupational distribution statistics at the industry level are not necessarily similar to distribution of occupations or activities within more representative, larger firms. Whereas 22.3 percent of employed persons in special trade construction firms are self-employed, 8.1 percent are self-employed in heavy and highway construction firms and only 1.4 percent in manufacturing. (Census data do not report this figure for general building contractors.) Of those classified as self-employed, 81 percent are classified as craftsmen in special trade construction, versus 48.9 percent in heavy and highway contractors and 19.6 percent in manufacturing. Again, for the self-employed, 12.7 percent in special trade construction are classified as managers and administrators, versus 42.5 percent for heavy and highway contractors and 26.1 percent for manufacturing. Thus, it is clear that there is a possible downward bias in the size of the administration for special trade contractors. Moreover, Table 1 shows that 61.9 percent of all special trade construction firms have no employees; that is, the "firm" is a self-employed individual. Another 22.8 percent have only 1–4 employees. These data suggest that census data understate the size of the administration in special trade construction firms; however, since special trade contractors are concerned with managing work in only one or a few trades and are responsible for only a part of the entire construction process, they may not require as large an administration as general building construction firms and heavy and highway firms, which are more like manufacturing firms since they coordinate the work of all trades in the construction project. Clearly, the large number of self-employed individuals and very small firms make industry-level occupational statistics of dubious value in considering organizational structure.

Size of Firm and Administrative Component. Managers and administrators comprise 46.8 percent of the administrative component in construction but only 18.8 percent in manufacturing (Table 1). One of the main reasons for this large difference is the small size of most construction firms. Less than 5 percent of all construction firms have 20 or more employees, compared to nearly 30 percent in manufacturing. For all construction firms combined, the average size is 4.7 employees, compared to 79.7 employees for manufacturing firms (Table 1). If an administrative component of 25–30 percent is assumed, the average construction firm has 1.2 to 1.4 administrative employees.

Since each firm has at least one manager and this manager, in a firm of five employees, is probably also performing professional and clerical duties, the proportion of managers versus professional and clerical employees in construction is overstated. Table 7 shows that the proportion of managers is greatest for general building contractors (65.2 percent), next highest for special trade contractors (49.3 percent), and lowest for heavy and highway contractors (27.8 percent), which are about four times as large as the other two types of construction firms and so are least affected by the classification problems.

Administrative Component. Small size alone does not explain the high proportion of managers and administrators. First, although general building contractors are slightly larger than special trade contractors, they have a greater proportion of self-employed individuals classified as managers (42.5 percent) than special trade contractors (12.7 percent). The same reasoning used to analyze the smaller reported size of the administrative component in special trade construction applies here. Second, special trade contractors perform a specific technical function, which is part of the total construction process. The many one-person special trade construction firms are individuals "working with the tools," which explains the large proportion of self-employed individuals classified as craftsmen. A one-person general building contractor, on the other hand, can manage a substantial amount of business by relying entirely on subcontractors to perform all of the physical work. Because of the general management responsibility for the entire project through foremen, job superintendents, and project managers, there is a greater need for managerial personnel in general building construction firms.

Professionalization. As shown in Table 7, heavy and highway contractors (45.1 percent) and manufacturing firms (35.9 percent) have much larger professional staffs than general building contractors (11.2 percent) and special trade contractors (10.7 percent). The index of "professionalization of authority" is nearly the same for heavy and highway contractors (61.8 percent) and manufacturing firms (65.6 percent). The large proportion of professionals in heavy and highway construction is not in accord with Stinchcombe's thesis of craft administration. Heavy and highway construction firms require much engineering expertise, and their larger size makes it possible to hire specialists. One-half of all professionals in heavy and highway construction firms are engineers and an additional one-third are engineering and science technicians. General building and special trade contractors also have a high proportion of engineers — higher than manufacturing firms — and about the same proportion of engineering and science technicians as manufacturing firms. The smaller proportion of professionals in general and special trade construction firms may be due to the fact that in small construction firms owner-managers and managers perform a number of technical and professional functions.

Managers and Clerks. The proportion of administrative positions held by clerks is the foundation of Stinchcombe's evidence for his interpretations. As in the case of professionals, however, the smaller proportion of clerks in construction is partly a result of the larger proportion of managers. However, heavy and highway contractors, which are most similar to manufacturing firms in average size, proportion of employees in administration, proportion of managers, and index of "professionalization of authority," are less like (27.7 percent) manufacturing firms (45.3 percent) in proportion of clerks than special trade contractors (40 percent) (Table 7). General building contractors (23.6 percent) are most like heavy and highway contractors. The relatively large proportion of clerks in special trade contractors is due to a low proportion of professionals (again because of unit classification problems and overlap of managerial and professional functions) and the smaller size of the total administration.

Further evidence of the unit-of-analysis problem in firms of very small size can be obtained by examining the subcategories of the clerical category. Very large firms make possible a high degree of task specialization. The influence of size on the division of labor, and the resulting classification problems, is well illustrated by examining the subcategories "secretaries" and "other" in Table 8. The latter is composed of typists, weighers, miscellaneous clerical workers, not specified clerical workers, and clerical and kindred workers—allocated. In a small firm, a single secretary would perform all the functions represented by these subcategories. Thus, whereas the "other" category is 22.8 percent for heavy and highway contractors and 22.4 percent for manufacturing, it is only 11 percent for general building contractors and 11.9 percent for special trade contractors. Yet the latter two industries have a larger proportion of secretaries than do heavy and highway contractors and manufacturing firms. Both subcategories combined comprise between 40 and 45 percent for all four industries. Similar reasoning explains the percentages of bookkeepers, statistical clerks, mail handlers, file clerks, and office machine operators. After secretaries, bookkeepers are the most basic clerical position in construction. For many contractors, the only clerical positions

Table 8

Percentage Distribution of Major Subcategories of Clerical and Kindred Workers by Type of Contractor and Manufacturing, 1970

Clerical subcategories	General building	Contractors Special trade	Heavy and highway	Manufacturing
Total clerical and kindred	100.0	100.0	100.0	100.0
Total for subcategories below*	95.1	95.4	90.2	91.2
Bookkeepers	24.6	29.5	17.2	10.4
Payroll and timekeeping clerks	4.1	2.3	5.6	2.7
Statistical clerks	0.6	0.4	2.4	2.1
Estimators and investigators, N.E.C.	14.9	16.6	6.0	1.5
Expediters and production controllers	1.8	1.2	2.0	5.7
Shipping and receiving clerks	0.6	1.0	0.5	9.0
Stock clerks and storekeepers	1.2	1.9	3.8	6.6
Mail handlers	0.3	0.2	0.8	1.4
File clerks	1.2	1.0	2.6	2.7
Office machine operators	1.3	0.8	3.9	6.0
Secretaries	33.3	28.7	22.5	20.7
Other†	11.0	11.9	22.8	22.4

Source: U.S. Bureau of the Census (1972: 249–264).

*Used 16 out of a total of 39 subcategories for this occupational category.

†Typists, weighers, miscellaneous clerical workers, not specified clerical workers, clerical and kindred workers — allocated.

are one secretary and one bookkeeper. The latter may even be part time.

CONCLUSION

Data used by Stinchcombe to support his thesis of craft administration can be explained in terms of small size, problems in census classifications, and role of the firm in the production process. Although industry-level statistics are useful as a means of getting one view on construction firms, they are inevitably crude indicators and subject to obvious aggregation problems. It is clear that there are many very small firms in the construction industry that cannot be described in terms of formal organizational analysis. These firms are simply a group of individuals with some rudimentary structure and management systems.[5] The division of labor is limited, and persons perform a variety of tasks, often including both administration and production tasks.

Case studies or, less preferably, surveys are needed to examine the division of labor between and within the administrative and production components of construction firms and to examine the relationship between the general contractor and the subcontractor. Comparative studies could explore the relationship between degree of subcontracting and characteristics of the construction firms. Exploring the differences between firms that differ in their subcontracting practices would more closely tie together the firm-market analysis (extent of subcontracting) and firm analysis (the administrative component) discussed in this paper.

Three objectives of such research would be: (1) a more detailed explanation of the level of the firm and of the patterns identified in the hypotheses presented on the relationships between subcontracting and complexity, size, and market extent, (2) explanations for differences in subcontracting practices and internal administration for similar firms (along the dimensions of market location, size, and complexity), in terms of management strategy, historical conditions, operating management style preferences, and organizational culture, and (3) an assessment of such relationships in terms of various criteria of organizational efficiency and effectiveness.

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[5] Blau (1966) in his study of *small* bureaucracies still rejected all public personnel agencies with a total staff of fewer than five persons.

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The Structuring of Organizational Structure: A Note

Hugh Willmott

The appearance of Ranson, Hinings, and Greenwood's "The Structuring of Organizational Structures" (1980) is to be welcomed for its concern to generate a more satisfactory framework for the analysis of organizational structure. The shortcoming of existing forms of analysis, they argued, lies in the unhelpful counterposing of two perspectives: those that address structure as a formal configuration of roles and procedures and those that attend to structure as a patterned regularity of interaction. Ranson, Hinings, and Greenwood's claim was "to articulate the latent linkages" that connect these frameworks and thereby incorporate them into "a more unified methodological and theoretical framework" (1980:1). Did they succeed?

Ranson, Hinings, and Greenwood introduced their discussion of organizational structure with the observation that its dominant feature is patterned regularity. This feature, they noted, has generally been conceptualized in one of two ways: either as "the prescribed *framework* of the organization" or as "the patterned regularities and processes of *interaction*" (1980:2). They contended that the unhelpful contrasting of "structure as prescribed framework" and "structure as patterned interaction" could be avoided by conceiving of structure as "a complex medium of control" (1980:3) which is continually shaping interaction and being produced and created through it.

In conceiving of structures as media of control that are "constituted and constitutive" (1980:3), Ranson, Hinings, and Greenwood drew directly upon Giddens' (1976:121) notion of the duality of structure: "social structures are both constituted *by* human agency, and yet, at the same time, are the very *medium* of this constitution." However, although they readily made use of Giddens' thesis to suggest the interdependence of the differing perspectives on structure, they did so without either fully appreciating or, alternatively, being critical of the difference between conventional perspectives on structure and Giddens' radical reformulation of them. For Giddens' conception of structure refers neither to prescribed frameworks nor to realized configurations of action, nor even to the linkages between framework and interaction. Rather, he employed the term "structure" to describe the properties — namely, signification, domination, and legitimation — that bind time and space into social systems (Giddens, 1976:122; 1979:64). So although Giddens' notion of the duality of structure bears a resemblance to Ranson, Hinings, and Greenwood's conception of structure as a complex medium of control, the likeness is rather superficial. This is most apparent when Ranson, Hinings, and Greenwood contend that contextual constraints, in addition to provinces of meaning and dependencies of power, provide the requisite elements for a theoretical model that reveals how the process of structuring defines and mediates organizational structures — conceived, it will be recalled, as media of control.

It is not difficult to see how provinces of meaning are constitutive of complex media of control. Nor is it difficult to appreciate how these provinces of meaning themselves reflect dependencies of power. However, it is extremely difficult to grasp how, in this context, any reference to contextual constraints is relevant for analyzing how structures — or media of control — are actually constituted and constitutive. For, if it is accepted that the structuring or social reproduction of structures is

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directly and inextricably tied to the constituting of interaction, then the focus for study must be upon how structures are practically constituted in, and constitutive of, interaction. From this perspective, mention of contextual constraints is redundant save insofar as they, for example, constitute an element of the actors' provinces of meaning.

Yet, Ranson, Hinings, and Greenwood (1980:11) are adamant that the influence of contextual constraints is "quite independent of an individual's perception of them.' To support their argument, they give the example of how demographic changes must *inevitably* have *some* impact upon school roles with attendant repercussions for structural arrangements. An actor's perception or interpretation of these changes, they argue, will shape only "the kind of structural response to contextual change" (1980:11). On the face of it, the authors' assertion is plausible enough: demographic change must surely have some impact upon the size and organization of schools, regardless of how these changes are perceived. Only the form that this change takes will be screened by perceptions. However, this assertion is plausible only if reference to the size of schools draws upon a conception of structure as a prescribed framework rather than as a medium of control. For, if the notion of "structure as a medium of control" is retained, Ranson, Hinings, and Greenwood's contention is unsupportable since organizations may expand or contract without any necessary or significant transformation of the media of control.

If our concern is to account for the *actual* structuring of organizational structures, then the focus of our analysis must be upon how this structuring is practically accomplished. Of course, in doing so, it is important not to lose sight of Ranson, Hinings, and Greenwood's crucial point that organizational structuring "does not exist in a vacuum" (1980:9). But, at the same time, it is equally important not to separate organizational structuring from the social totality that it serves to reconstitute. From this standpoint, there is neither room nor sense in introducing the concept of contextual constraints. For the structuring of structures can be studied only through the analysis of interaction, and this cannot be grasped by correlating modes of structuring with forms of constraint. In this respect, Ranson, Hinings, and Greenwood are both right and wrong to be critical of Pfeffer and Salancik (1978) who, following Weick (1969), argued that external conditions are enacted by decision makers' selective perceptions and screening of information about them. They are right to question the adequacy of Pfeffer and Salancik's (1978) understanding of how information is selectively perceived and screened. However, they are wrong insofar as their critique is informed by an assumption that "contextual constraint" must form an integral part of a model for revealing how organizational structures are defined and mediated by the process of structuring.

Had Ranson, Hinings, and Greenwood consistently adopted Giddens' (1976) theory of structuration, they would have avoided a reversion to conceptualizing structure as something that is somehow separate from, and conditioned by, constraints in its external environment. For, in Giddens' framework, structures are theorized as the properties of social systems that are the medium and outcome of the practices that constitute social systems. Clearly, to grasp the radical implications of Giddens' thesis requires an extended discussion, whereas space permits only a sketch of his framework. Briefly, interaction and structure are compared by Giddens to speech and language: "just as every sentence in English expresses within itself the totality which is the 'language' as a whole, so every interaction bears the imprint of the global society" (Giddens, 1976:122). Identifying three analytically separable dimensions of structures (signification, domination, and legitimation) and three equivalent dimensions of interaction (communication, power, and morality/sanction), these are understood to be mediated by three "modalities": interpretive schemes, facilities, and norms. These modalities are drawn upon by actors in their constitution of interaction. But, equally, they are the media for the reproduction of the structural components of social systems. Thus, systems of signification allow agents to communicate with each other through the application of interpretive schemes. Systems of domination enable interactants to affect each other's conduct through the application of facilities (i.e., rules and resources). And, finally, systems of legitimation permit the sanctioning of interaction through the application of norms. Diagrammatically:

Dimensions of Structure	Modalities	Dimensions of Interaction
Signification	Interpretive scheme	Communication
Domination	Facility	Power
Legitimation	Norm	Morality/sanction

The duality of structure in interaction (adapted from Giddens, 1976:122).

Employing Giddens' conceptual framework, the reproduction of organizational reality can be analyzed in terms of interlocking modalities comprising interpretive schemes, facilities, and norms. By focusing upon interpretive schemes (e.g., hierarchy), the structuring of organizational structures is intelligible in terms of the background assumptions, meanings, and sense-making practices that inform mutual understanding. Alternatively, by concentrating on facilities (e.g., rules and resources), the reproduction of organizational structures can be studied as the outcome of the efforts of dominant, socially advantaged groups to consolidate the means of securing their advantage (Bourdieu and Passeron, 1977). Finally, the structuring of organizational structures can also be explored through an examination of systems of norms (e.g., the achievement ethic, contractual obligations).

Modalities can be studied in one of two interrelated ways. Either their status as a feature of a system of social interaction is bracketed, in which case they are addressed as stocks of knowledge and resources upon which actors draw in their social relations. Or, where actors' methods of mobilizing these stocks and resources are bracketed, the focus is upon modalities as features of social systems. The significance of the level of modality is that it provides a means of articulating the connection between the levels of "action" and "system." Or, as Giddens (1979:81) puts it, the introduction of the level of modality provides "the coupling elements" whereby the bracketing of actors' strategic conduct or the properties of social systems are "dissolved in favor of an acknowledgment of their interrelation."

Ranson, Hinings, and Greenwood exposed the unhelpful contrasting of 'structure as framework" and "structure as interaction," suggesting that this can be avoided by conceiving of structure as a complex medium of control. To this end, they employed the rhetoric of Giddens' theory of structuration, while largely disregarding its substance. Consequently, the gap between the two perspectives on structure is left untheorized and unbridged. For the difference between "structure as framework" and "structure as interaction" cannot be reconciled simply by asserting that structure "describes both the prescribed frameworks and realized configurations of interaction, and the degrees to which they are mutually constituted and constituting (Ranson, Hinings, and Greenwood, 1980:3). The reason for this is that the theoretical standpoint from which structure describes framework is not the same as the standpoint from which structure appears as interaction. This, of course, is the gist of Blau's (1974:14) assertion that an inquiry that aspires to encompass both standpoints is "unlikely to produce a systematic empirical or theoretical inquiry into either" (quoted in Ranson, Hinings, and Greenwood, 1980:3). It is also Giddens' (1976, 1979) point when he contends that the dualism between "action" and "system" must be replaced by the notion of the duality of structure. However, whereas Blau remains locked in a tradition that counterposes "structure as framework" to "structure as interaction," Giddens (1976, 1979) develops an alternative standpoint from which social systems are understood to have structural properties that are the medium and outcome of the strategic conduct of actors who produce and recreate those systems. From this standpoint, the view of structure as framework is transcended in favor of structure as a property of social systems that are reproduced through social interaction. Similarly, the conventional conception of structure as interaction is transcended in favor of recognizing how interaction is accomplished by drawing upon the structural properties of social systems.

Of more general relevance, Ranson, Hinings, and Greenwood's thesis displays a problem endemic to the tradition of organization theory. In this tradition, analysis is founded upon managerial characterizations of organizational reality (Bittner, 1965). One such characterization is "organizational goal"; another is "organizational structure." Where idealizations of this kind have been found wanting in terms of their capacity to satisfy the practical interests of managers and administrators, theorists have sought to attend to the significance of complementary glosses such as "informal structure" and "process." Arguably, Ranson, Hinings, and Greenwood (1980:3) sustain this tradition when they assert the existence of "two kinds of structure" and seek to analyze their interdependence. For although they acknowledge that the conception of structure as framework "stand(s) in rather a superficial relationship to the day-to-day work of an organization" (1980:2), they nonetheless take for granted the sense of theorizing the structuring of organizational structures in terms of contextual constraints.

The alternative is to base organizational analysis upon an unashamedly sociological conception of structure. In such a conception, one cannot afford to accept conventional hierarchies of credibility when it comes to selecting and developing concepts for the scientific study of organizations. Of course, as Bittner (1965) observes, borrowing a concept from commonsense — such as "organization" or "structure" — is virtually unavoidable. However, from a sociological standpoint, a transgression occurs when the commonsense usage of commonsense concepts is assumed to provide an adequate foundation for analysis. For, as Albrow (1968:163) has commented, a science that is based upon managerial conceptions of organizational structure is inevitably "misguided in its empirical analysis of organizations." The advantage of Giddens' (1976, 1979) notion of the duality of structure is that it situates the strategic conduct of actors within systems of interaction, without drawing upon a commonsensical conception of structure as external constraint. Thus, Giddens' framework provides a real alternative to perpetuating the dualism between "structure as framework" and "structure as interaction" that lies at the heart of contemporary organization theory. Moreover, in doing so, it provides a schema for a fuller appreciation of the sense of Salaman's (1981:229–230) recent contention that "without the clear recognition that the design of work, the distribution of work rewards [and] the process of organizational control and legitimation . . . reflect the class relations of the wider society, our understanding of organizational process and structures can at best be partial, at worst, hopelessly unreal."

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Influence in Corporate Networks: An Examination of Four Measures

Mark S. Mizruchi and David Bunting

This study evaluates four quantitative measures of influence in networks of large corporations: (1) the absolute number of interlocks; (2) the Bonacich centrality index; (3) a modification of the Bonacich index using strong ties only; and (4) a further modification of the Bonacich index using strong ties weighted for directionality. These measures are applied to data from a sample of large American corporations in 1904, and the results are compared with the historical record. Results from the more sophisticated measures are shown to more closely resemble historical accounts of the period. Implications of these findings for studies of intercorporate relations are discussed.•

BACKGROUND

The Corporate Control Debate

The issue of power among large corporations has its roots in the classic study by Berle and Means (1968) in 1932. These authors argued that as corporations grew, the large blocks of stock once held by wealthy families gradually dissipated. The result was a separation of stock ownership from corporate control. According to Berle and Means, effective control was increasingly held by insiders, those who ran the daily activities of the firm. This view was accepted by nearly all organization theorists at least until the late 1960s. However, in recent years it has been challenged on both theoretical and empirical grounds (Zeitlin, 1974; Mintz, 1978; Useem, 1980).

Most studies of corporate control have employed stock ownership data to locate control (Temporary National Economic Committee, 1940; Villarejo, 1961; Patman Committee, 1968; Larner, 1970; Burch, 1972; Kotz, 1978). The problem with this approach is that although one can often find who holds the largest block of stock, this information may not reveal who in fact controls the firm. For example, in 1962 Howard Hughes owned 78 percent of TWA stock, but TWA was in fact controlled by a consortium of banks and insurance companies (Fitch and Oppenheimer, 1970). In 1901, J. P. Morgan & Co. owned a negligible fraction of U.S. Steel stock and yet completely dominated the firm (Corey, 1930). Controlling elements in both cases were other corporations, suggesting that it may be profitable to search for control in the structure of relations among the corporations. This was done to some extent by the Patman Committee (1968) and Kotz (1978) who reintroduced the idea of bank control over non-financials (Brandeis, 1914; Lenin, 1975). However, both studies used the individual firm as the unit of analysis. They located the largest stockholder and classified the firm on that basis. This approach failed to view the firm in the context of a corporate system in which multidimensional control relations often exist.

Influence and Interlocking Directorates

A number of studies have employed interlocking board memberships among corporations as indicators of control (Fennema and Schijf, 1979; Useem, 1979; Pennings, 1980). Such studies go back as far as the Pujo Report (U.S. Congress, 1913), a congressional investigation into corporate concentration. Interlocks have also been used as indicators of control by Brandeis (1914), the National Resources Committee (1939), and more recently by Perlo (1957), Fitch and Oppenheimer (1970), and

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Knowles (1973). Control through interlocking board memberships was a practice widely recognized by historians of the early 1900s. Investment banks and other firms would place representatives on the boards of corporations they controlled, as J. P. Morgan & Co. did with U.S. Steel (see Mizruchi, 1981, for a review of this literature). It is current practice to recognize that powerful interests in corporations are entitled to board representation. Such interests include large stockholders, major lenders, customers, and suppliers (see Mace, 1971; *Business Week,* 1980a; 1980b, for some examples).

Since corporate boards typically include from 10 to 25 or more members, however, having two or three representatives does not ensure control. Furthermore, several theorists have argued that interlocking involves "cooptation" of outside interests rather than submission to them (Thompson and McEwen, 1958; Pfeffer, 1972; Allen, 1974; Pfeffer and Salancik, 1978). Thus, since boards are often represented by a plurality of interests, a more accurate description of interlocking would be that it permits influence rather than control. Influence has been defined as leadership ability in situations of collective activity and as the ability to affect the outcome of events (Hopkins, 1964). The definition employed here is the ability of an organization to exercise power over another organization, power being the ability to realize one's goals even in the face of external opposition (Weber, 1947:152). Control is defined as the ability to determine the long-run policies of a firm (Juran and Louden, 1966: 48; Kotz, 1978). Of course, influence and control often correspond, but influence need not constitute control, and thus it is the more general term.

Measuring Influence with Interlocks

It follows from the above discussion that one way of measuring influence in networks of corporations is to sum each firm's number of interlocks. Those firms with the highest number of interlocks would be the most influential in the network. A number of criticisms have been levelled against this approach, however. First, it ignores the considerable variance in the number of directors per company and, therefore, the potential of a company to establish affiliations (Bonacich, 1972a). Second, it implicitly weights all interlocks equally and assumes a linear relationship between interlocks and other organizational characteristics. Third, it ignores the direction of interlocking. Which corporation does an interlocked director represent? Some companies may have a large number of interlocks because they are influential, while others may simply be coopted. Finally, this approach ultimately treats the individual firm as the unit of analysis. Knowledge of a firm's number of interlocks may tell little about where it stands in relation to other firms in its interorganizational network. One firm may have five interlocks with five heavily-interlocked firms while another may have ten interlocks with two relatively obscure firms.

Centrality and Influence

Recently, considerable effort has been devoted to developing more sophisticated models of network relationships. Developments derived from small-group network research include the use of multidimensional scaling (Levine, 1972; Laumann and Pappi, 1976; Galaskiewicz, 1979), factor analysis (Allen, 1978), input-output and differential equation models (Burt, 1979), and the blockmodel approach (Breiger, Boorman, and Arabie, 1975; White, Boorman, and Breiger, 1976; Arabie and Boorman, 1977; Breiger, 1977). (For an extensive review of the various network models, see Burt, 1980.) These techniques are only beginning to be applied to interorganizational networks. One technique that has been used almost exclusively as a measure of influence in corporate networks is the measure of centrality developed by Bonacich (1972a, 1972b) and modified for corporate network research by Bearden et al. (1975) and Mariolis, Schwartz, and Mintz (1979). This measure utilizes the classic sociometric concept of centrality. A point (e.g., a company) is central to the extent that: (1) a large number of other points can be reached in a small number of steps (Bavelas, 1948, 1950; Mackenzie 1966; Nieminen, 1973; Freeman, 1977) and (2) paths from other points must go through it in order to reach third points (Freeman, 1979). In the present study, the Bonacich centrality measure was chosen over other similar measures because it lends itself to a unique set of matrix manipulations.

Centrality is defined operationally as a function of a point's structural position within a set of relations. However, numerous studies have found a strong relationship between centrality and other characteristics. Leavitt (1951), for example, found that centrality in communication networks was strongly correlated with variables such as satisfaction in group activity, leadership, and influence on the outcome of events. Using four types of communication structures, he found that the differences between the most central figure and the others increased with increasing hierarchy of each structure. Studies by Bass (1949), Strodtbeck (1954), and March (1956) provided similar evidence of the relation between centrality (as measured by time spent interacting or by acts initiated) and influence. In a summary of this evidence in connection with a study of his own, Hopkins (1964) concluded that centrality was a strong predictor of both influence and rank (leadership). In his study, the correlation between centrality and influence was .82.

Similar results have been found in interorganizational studies such as those by Perrucci and Pilisuk (1970), Laumann and Pappi (1976), Galaskiewicz (1979), and Rogers and Maas (1979), which found strong relationships between reputed influence and centrality in interorganizational networks.

METHOD

Testing the Validity of Centrality as a Measure of Influence

The evidence from both small group and interorganizational research thus suggests that network centrality is strongly related to a number of hierarchical characteristics, including influence, leadership, and status. This in turn suggests that a centrality measure could serve as an indicator of influence among large corporations, but it has not been demonstrated that centrality measures produce results substantially different from results based on number of interlocks. Although Mariolis (1975) produced some different results, his data were from recent years and, thus, interpretation was difficult. The present study addresses this problem by choosing data that are more easily interpretable and for which reliable independent evidence exists. Using these data, the Bonacich centrality index was compared to a simple count of number of corporate interlocks. In addition, two modifications of the Bonacich centrality index were tested.

The number of interlocks and the three measures of centrality were calculated for 166 large American corporations from the year 1904. Next, these four measures were compared with historical accounts of the period to determine which provided the most accurate measure of corporate influence. Unlike recent years, in which there has been sharp controversy over the relative power of various corporations (especially banks), the period around the turn of the century was characterized by an almost uniform consensus concerning the power of certain groups in the economy.

Data Selection

The year 1904 was chosen for a number of reasons. First, it was part of the era of finance capitalism, when no important regulatory constraints influenced affiliations. Second, corporate influence had begun to be measured by affiliations; stock ownership was no longer considered the primary basis of corporate control (Corey, 1930:284). Because small stockholders were widely dispersed, major capitalists found it relatively easy to elect themselves or their representatives to a directorship of nearly any large company (Bunting, 1979). Finally, during this period there was an active group of business writers and academicians who were concerned about the growing concentration of control of American finance and industry. These writers, who contributed to publications such as *The Wall Street Journal, Railway World,* and *Atlantic Monthly,* were in no sense antagonistic to big business. Instead, they urged curtailment of certain activities so that business could operate unhampered by visionary social legislation. 1904 was chosen over other years in the same period because it was the year of greatest interlocking.

Data used in the study consisted of officer and director interlocks for 166 large American corporations in 1904. The sample included the largest 99 industrials, 25 transports, 10 insurance companies, 20 banks, and 12 large investment houses. Because asset values were not generally available, size was determined by capitalization (par value of issued stock plus funded debt). Investment banks were selected subjectively, since they disclosed no financial information. Primary data sources were financial manuals such as the *Manual of Statistics, Moody's, Banker's Directory,* and the *New York Stock Exchange Directory,* supplemented by *Who Was Who* and the *Dictionary of American Biography.* For further discussion of data selection see Bunting and Barbour (1971) and Mizruchi (1981).

The Bonacich Centrality Index

Based in part on the earlier work of Katz (1953) and Hubbell (1965), Bonacich (1972a, 1972b) argued that a point's centrality in a network should depend on three criteria: (1) the number of links to other points; (2) the intensity of the links; and (3) the centrality of those with whom one is linked. For organizations, the number of potential linkers in each unit can be accounted for in the measure of intensity. If R is a matrix of relationships (r) and C is a point's centrality, then for each point i

$$C_i = r_{i1}C_1 + r_{i2}C_2 + \ldots + r_{in}C_n$$

or

$$C_i = \sum_{\substack{j=1 \\ j \neq i}}^{N} r_{ij} * C_j \ ,$$

where N = number of organizations linked with i; r_{ij} = intensity of the particular link; C_j = centrality of the organizations linked with i.

To find C_i, a matrix of overlaps (R) must be computed. There are several possible measures of intensity that can be used (for a discussion of these, see Mariolis, Schwartz, and Mintz, 1979). In the present study, the measure developed by Mariolis (1975) was used:

$$r_{ij} = \frac{b_{ij}}{\sqrt{d_i * d_j}} \ ,$$

where b_{ij} = number of members in common, and d_i and d_j = number of potential interlockers from each organization.

This measure has three advantages: First, following Bonacich, it controls for the number of potential affiliations that a company might possess; for example, a company with forty directors on its board has more opportunities to interlock than one with eight. Second, using the square root of $d_i * d_j$ minimizes the effect of increasing board size, because the importance of each additional member decreases; for example, the difference between boards of four and three members is much greater than that between boards of 17 and 16 members. Finally, this figure is equivalent to a Pearson product-moment correlation statistic prior to subtracting out the means; hence, r_{ij} can be interpreted as a correlation coefficient.

Centrality scores were calculated as a system of simultaneous linear equations in the form $C = RC$ where C is an $N \times 1$ vector of centrality scores (N = the number of points in the system) and R an $N \times N$ correlation matrix containing the measures of overlap r_{ij}. This equation, as it stands, has no solution. However, Bonacich (1972b) demonstrated that by multiplying C by the largest eigenvalue (λ), so that $\lambda C = RC$, an approximation can be reached. Hence:

$$C_i = \frac{1}{\lambda} \sum_{\substack{i=1 \\ j \neq}}^{N} r_{ij} * C_j \ ,$$

where λ = the eigenvalue of the first principal component.

Although it has a different purpose, this calculation is identical to factor analysis. The first eigenvector will have all non-negative or non-positive values, and there will be as many all-same-sign eigenvectors as there are discrete components in the graph. All other eigenvectors will have some negative and some positive values. Because the calculation produces one more unknown than the number of equations, the actual value of the centrality scores is arbitrary. The one arbitrary parameter is selected such that the firm with the highest centrality receives a score of 1.0. Other scores then range from 0 to 1.

The equations are solved by means of the power method for extracting eigenvectors (Noble, 1969: 299–300). In some cases, two firms are so heavily interlocked with each other that their centrality scores become inflated, thus distorting the entire system. Because such situations are rare yet have significant effects, the suggestion of Bearden et al. (1975) that the number of recorded interlocks in r_{ij} be limited to three has been followed.

Measuring Strength of Ties

The Bonacich centrality measure fails to distinguish between different types of interlocks. To correct this problem, a measure incorporating Granovetter's distinction between strong and weak ties, based on the frequency and intensity of interaction (Granovetter, 1973), may be applied. This concept has been used to indicate the significance of a particular interlock (Bearden et al., 1975). Strong ties are indicated by a director's principal affiliation, usually determined by whether he or she is an officer of the firm (Warner and Unwalla, 1967). When an officer of corporation A is a director of B and C, there are A-B and A-C links, but a B-C link also occurs. The A-B and A-C links are designated strong ties and the B-C link a weak tie. Weak ties may be important, since in some cases they provide bridges between cliques. However, when given the same weight as strong ties, they may create noise in the system by overstating the number of affiliations between companies. By removing the weak ties, a clearer picture of subgroups within the network may be gained. Although the exclusion of weak ties produces a different correlation matrix from the original R matrix, the equations for centrality are solved in the same manner.

The Directional Strong Tie Measure

An added dimension may be gained by accounting for the direction of interlocks (Mintz, 1978). In A-B and A-C links where the person is an officer of firm A, the interlocks can be viewed as A "sending" to B and C. This distinction is incorporated into the centrality index by means of a weighted measure of r_{ij}:

$$\text{sending:}\quad r_{ij} = \frac{W_s * S_{ij}}{\sqrt{d_i * d_j}}$$

where S_{ij} = number of officers of firm i who sit on the board of firm j;

$$\text{receiving:}\quad r_{ij} = \frac{W_r * T_{ij}}{\sqrt{d_i * d_j}}$$

where T_{ij} = number of officers of firm j who sit on the board of firm i;

$$\text{exchange of officers:}\quad r_{ij} = \frac{W_s * S_{ij} + W_r * T_{ij}}{\sqrt{d_i * d_j}},$$

where W_s = weight of sender; W_r = weight of receiver; $W_s + W_r = 1$; we have set $W_s = .9$ and $W_r = .1$.

The assigned weights are, of course, arbitrary. They are based on the assumption that A exercises a disproportionate share of influence over B but that this influence is not absolute. As with most measures of this type, their value is determined by the tenability of the results they produce.

The directional matrix is asymmetric such that $R \neq R'$ while the Bonacich centrality measure is based on the assumption of a symmetric matrix. The problem with the asymmetric matrix is that more than one solution to the equation is possible. The solution chosen was the largest eigenvector, as with the symmetric matrix. Other solutions would be extremely difficult to extract. Furthermore, the chosen solution checked, i.e., the results were correct according to the formula for centrality. In addition, the results based on this measure were shown to correspond closely with the historical record. Nevertheless, further work is needed to extract other possible roots of this equation for asymmetric matrices. Bonacich has devised a technique to make the matrix symmetric by multiplying R by R' and then treating this product as R in the original equation. (We thank Peter Mariolis for calling our attention to this idea.) The consequences of this modification are under study.

The continued use of the term "centrality" to describe the directional measure may be confusing to some readers, in particular those who, because of the asymmetry, find this measure similar to Moreno's concept of "prestige" (Moreno, 1953). In Moreno's concept, and in popularity measures in general, those with high status are chosen as friends more frequently than they choose others as friends (Burt, 1980). In our terms, these individuals receive more interlocks than they send. In the present analysis of corporate influence, it is argued that those with high influence send more than they receive. The term "centrality" is used even in the directional measure because directional centrality is based on the same structural view of centrality as the full matrix measure. The only difference is that in the directional measure a firm's centrality is weighted based on the particular character of different interlocks. The resource dependence position is closer to the concept of interlocking as prestige because the influential organization is that which has the ability to coopt other organizations (Pfeffer and Salancik, 1978). Thus, the more influential corporation receives more interlocks than it sends. However, what the receiving corporation has, first and foremost, is control over crucial resources. Prestige, if it in fact accompanies centrality in this case, is a secondary concern.

Furthermore, this position is not contradictory to a resource dependence perspective, since control over specific resources, such as loan capital, is frequently what allows a firm a seat on another firm's board. As Aldrich (1979:296) has pointed out, "the term cooptation may involve too much 'voluntarism' in some cases, such as when taking on a director from a bank is the price a firm pays for having its corporate bonds underwritten." Historically, there is far more evidence to support the "sending as influence" perspective advanced here. The evidence for recent years is not conclusive either way. However, one of the major advantages of this measure is that it allows for flexibility in response to changing theoretical requirements. The weights for sending and receiving can be altered in any way, or even reversed, to suit alternative theoretical criteria.

RESULTS

Four measures of relative influence in corporate networks have been presented. These are: (1) a measure based on absolute number of interlocks; (2) the Bonacich centrality index, based

Table 1

Pearson Product-Moment Correlations among Four Measures of Centrality

	1	2	3
1. Number of interlocks			
2. Full network centrality	.89		
3. Strong tie network centrality	.71	.84	
4. Directional strong tie network centrality	.49	.63	.91

on the full network of all interlocks; (3) a centrality index based on strong ties only; and (4) a centrality index based on strong ties weighted for directionality.

Table 1 lists the Pearson product-moment correlation coefficients for the four measures for all 166 firms in the sample. Although the relation between the number of interlocks and full network centrality was quite strong (.89), the results of the more complex measures were increasingly different from those based on the number of interlocks.

Given the substantial differences in results, the historical record must be examined to determine the efficacy of each of the four measures. Table 2 presents the twenty most central corporations, based on each of the four measures, as well as their locus of control as reported by observers of the period. Control is treated here as the purest form of influence. Firms that control other firms will be relatively influential, while controlled firms will be less influential. Control was defined in terms of recognized leadership and commonality of interests, rather than in terms of legal criteria such as stock ownership. Control in this sense is very difficult to define; nevertheless it was widely thought to exist in 1904. One writer clearly described this form of control when discussing J. P. Morgan's power over large New York banks in 1910:

> Many of the banks are popularly supposed to be controlled by stock ownership in the Morgan house. That does not matter. Nobody cares very much who collects the dividends on the stocks of these banks. The important question, from the standpoint of Mr. Morgan and the standpoint of the people is rather: "Who runs this bank?" . . . Perhaps the Morgan-Baker group, combined, does control the First National and the Chase National. I don't see that it makes any difference whether they do or not, so long as they can say to these banks, alike in crisis or in fair weather: "Do this!" — and the banks do it (Keys, 1910:12621).

The corporations under study were classified in three categories as "controlling," "allied," or "controlled." Companies in the first category included the leading members of the two major financial groups of the time: J. P. Morgan & Co., on the one hand, and the "KL-SO-H" alliance of Jacob Schiff of Kuhn, Loeb & Co., William Rockefeller of Standard Oil, James Stillman of National City Bank, and Edward H. Harriman of Union Pacific, on the other. Companies such as Rock Island and Speyer & Co., which were independent of external control and relatively isolated from the above two financial groups, were also placed in the first category. Companies in the second category included those such as George F. Baker's First National Bank and James J. Hill's Great Northern-Northern Pacific complex, both of which, although somewhat subordinate to Morgan, were essentially operated independently and controlled other firms in their own right. The final category includes controlled companies such as U. S. Steel (under Morgan

Table 2

Most Influential Companies in 1904

Rank*						
I	F	S	D	Name	Control	Sources†
—	—	1	1	J.P. Morgan & Co.	Morgan	
12	10	3	2	New York Life	Morgan controlled	("Q.P.," 1905–1906a: 7317)
13	5	2	3	Great Nor. & Nor. Pacific R.R.	Morgan allied	(Cunniff, 1902: 1777)
20	11	5	4	International Harvester	Morgan controlled	(Pratt, 1903–1904: 4264)
14	15	7	5	U.S. Trust	KL-SO-H controlled	(Bullock, 1903: 187)
10	7	6	6	National City Bank	KL-SO-H	(Bullock, 1903: 187)
18	8	4	7	First National Bank (NY)	Morgan allied	(Bullock, 1903: 187)
—	—	9	8	Standard Oil	KL-SO-H	
—	—	15	9	Central Trust	Morgan controlled	(Pratt, 1903–1904: 4264)
—	—	14	10	Title Guarantee & Trust	Morgan controlled	(Keller, 1963: 141)
7	9	8	11	New York Trust	Morgan controlled	(Keller, 1963: 154)
—	—	20	12	Kuhn, Loeb & Co.	KL-SO-H	
15	13	16	13	Chicago & Alton R.R.	KL-SO-H controlled	(Keys, 1905: 6310)
9	12	12	14	Union Pacific R.R.	KL-SO-H	(Cunniff, 1902: 1777)
4	18	13	15	Mutual Life	Morgan controlled	("Q.P.," 1905–1906b: 7385)
—	20	17	16	Amalgamated Copper	KL-SO-H controlled	(Pratt, 1903–1904: 4265)
—	—	—	17	Speyer & Co.	Independent	
—	—	—	18	Winslow, Lanier & Co.	Independent	
—	—	—	19	Rock Island R.R.	Independent	(Moody and Turner, 1911: 420)
—	—	—	20	Seaboard Air Line R.R.	Independent	(Newcomb, 1901: 166)
3	3	10	—	U.S. Steel	Morgan controlled	(Pratt, 1903–1904: 4264)
1	6	11	—	National Bank of Commerce	Morgan controlled	(Keys, 1907–1908: 9530)
6	1	18	—	Erie R.R.	Morgan controlled	(Cunniff, 1902: 1777)
11	2	19	—	New York Central R.R.	Morgan controlled	(Keys, 1906–1907: 8439)
5	4	—	—	Baltimore & Ohio R.R.	Penn controlled	(Daggett, 1908: 32)
—	14	—	—	Lehigh & Wilkes-Barre Coal	Morgan controlled	(Cunniff, 1902: 1777)
19	16	—	—	Reading R.R.	Morgan controlled	(Newcomb, 1901: 166)
16	17	—	—	Chicago & Northwestern R.R.	Morgan controlled	(Cunniff, 1902: 1777)
17	19	—	—	Lehigh Valley R.R.	Morgan controlled	(Cunniff, 1902: 1777)
2	—	—	—	Equitable Life	KL-SO-H controlled	("Q.P.," 1905–1906a: 7317)
8	—	—	—	Equitable Trust	KL-SO-H controlled	(Keller, 1963: 147)

Note: Corporations ranking in the top 20 according to one or more of the four measures are listed.

*I=number of interlocks measure; F=full network centrality measure; S=strong tie network centrality measure; D=directional strong tie network centrality measure.

†See Appendix for a reference list of the sources used.

domination), Amalgamated Copper (under Standard Oil-National City control), and various railroads controlled by Morgan.

Turning now to the companies listed in Table 2, it is apparent that most companies ranked high in number of interlocks (I) were controlled by some other firm. Included in this group were National Bank of Commerce (an insurance bank partly owned by Equitable and Mutual but dominated by J. P. Morgan), Equitable Life and Equitable Trust, so heavily interlocked with each other (18 times) as to overstate their actual importance in the network, and four railroads either reorganized by Morgan (Erie, Reading, and Lehigh Valley) or controlled in his interest (the Chicago and Northwestern, by the Vanderbilts). The list contains some major controlling concerns such as First National Bank, National City Bank, and Union Pacific, but three key documented sources of influence have been omitted: J. P. Morgan & Co.; Kuhn, Loeb & Co.; and Standard Oil. Corporations known to be dominated by Morgan or KL-SO-H interests were included, yet the controlling parties themselves were excluded.

The full network centrality measure (F) also suffered this flaw. Using this measure eliminated the Equitable Life-Trust combination from the list and increased the centrality of both the First National Bank and National City Bank. However, it also added Lehigh & Wilkes-Barre Coal, a captive anthracite company controlled by Reading through its subsidiary, Central of New Jersey Railroad. Still included were many controlled companies and still absent were the three major firms mentioned above. However, the strong tie measure (S) produced rankings much more consistent with the historical record. The various railroads known to be under financial dominance did not appear, and the three principal financial firms were all included. J. P. Morgan & Co. enters the list at the top, while Central Trust and Title Guarantee and Trust, two trust companies heavily involved in securities, enter in the lower half. KL-SO-H influence is explicitly recognized by the inclusion of both Kuhn, Loeb & Co., and Standard Oil, the principal members of the group. However, the strong tie measure still includes a number of companies known to be subsidiary to outside interests, for example, U.S. Steel and the National Bank of Commerce.

The best results were found when the directionality of intercorporate relationships was considered. This measure (D) identified the major members and their allies for both the Morgan and KL-SO-H groups while excluding dependent companies such as U.S. Steel and New York Central. Under this method, Morgan & Co. continues its top ranking, while Kuhn, Loeb & Co. was ranked twelfth. However, even this method showed controlled firms among the most central (e.g., International Harvester and Chicago & Alton). This suggests either that the method is still imperfect or that Morgan or KL-SO-H influence was not unilateral. Both the number of interlocks measure and the full network centrality measure showed only four firms in the top twenty that could be considered independent of control by another corporation. The strong tie measure showed seven independents among the top twenty while the directional strong tie measure showed eleven. This further suggests that the directional strong tie measure is the most capable of identifying powerful firms in the corporate world.

Because of the high correlation between the number of interlocks and the full network centrality score, it appeared that the number of sending interlocks might be used interchangeably with directional centrality scores. The correlation between directional interlocking and directional centrality in these data was .87, and the correlation between all interlocks and directional interlocks was .62. Thus, while it is true that most of the variation in directional centrality was accounted for by directional interlocking, there are two reasons why the centrality score is preferable. First, the interlock measure does not control for number of directors, weights all interlocks evenly, and treats the individual firm as the unit of analysis. Second, there were a number of cases in which the superiority of the centrality measure was clearly evident. For example, Kuhn, Loeb & Co. had only 9.0 directional interlocks but was twelfth in centrality. Equitable Life had 14.5 directional interlocks but was ranked only thirty-first in centrality. There are occasions in which unusually high centrality was derived from one particular interlock with another highly central firm. Mintz and Schwartz (1978) devised a technique for "denormalizing" the network by removing from a firm's centrality score any link with firms whose centrality is more than a certain proportion (80 percent in their study) of its centrality. This technique did not produce an appreciable change in the rankings of the most central firms in the present study.

Centrality by Sector

To determine the relative influence of different sectors of the economy, an analysis of variance in centrality by sector was conducted (see Table 3). In the full network, railroads as a group were highly central and industrials had low centrality. Insurance companies, investment banks, and commercial banks, which were treated together as financials, accounted for only 6.2 percent of the variation, and .9 percent came from a negative direction because of the low centrality of investment banks. In all, 28.1 percent of the variation in centrality was accounted for by type of firm. Results were different for the strong tie and directional strong tie networks. Although industrial centrality remained low, railroad centrality dropped sharply from 14.6 percent of the total variation to 2.7 percent in the strong tie network and .1 percent in the directional network. Financials, meanwhile, accounted for 9.3 percent and 11.4 percent of the variation, all in a positive direction, a sharp increase from their position in the full network. The five sectors combined accounted for 19.4 percent and 17.5 percent of the total variance, somewhat less than for the full network.

These percentages are still significantly larger than Mariolis' (1975) findings for corporations in 1969. For Mariolis, type of firm accounted for only 5.2 percent of the variation in centrality in his full network, 4.2 percent of which was accounted for by commercial banks alone. An analysis of variance of number of

Table 3

Analysis of Variance of Centrality by Sector

Sector (*N*)	Mean	S.D.	% Total SS accounted For
Full Network			
Industrials (99)	.116	.180	7.3
Transports (25)	.468	.307	14.6
Insurances (10)	.241	.315	.1
Investment banks (12)	.114	.182	.9
Banks (20)	.381	.290	5.2
Total (166)	.208	.265	28.1
Strong Tie Network			
Industrials (78)	.098	.139	7.4
Transports (24)	.256	.196	2.7
Insurances (7)	.281	.314	1.4
Investment banks (11)	.206	.286	.2
Banks (17)	.338	.252	7.7
Total (137)	.174	.209	19.4
Directional Strong Tie Network			
Industrials (78)	.056	.110	6.0
Transports (24)	.134	.171	.1
Insurances (7)	.227	.315	1.7
Investment banks (11)	.234	.297	3.0
Banks (17)	.257	.247	6.7
Total (137)	.118	.190	17.5

interlocks by sector in the present data produced an explained variation of 27.5 percent. Industrials accounted for 7 percent of total variation, railroads for 9.8 percent, insurances .9 percent, investment banks 1.9 percent, and banks 7.7 percent.

This pattern suggests that the high full network centrality of railroads was a result of the frequent placement of financial representatives on railroads' boards, as well as the latter's high proportion of neutral interlocks. This is consistent with historical evidence of the importance of railroads at the turn of the century and their heavy dependence on financials. It is also consistent with evidence of the pivotal role played by financial institutions in the economy. Thus, from analysis of both the most central corporations and the network as a whole, the measure that considers network centrality, eliminates weak ties, and weights interlocks according to direction provides the most accurate measure of influence among corporations.

CONCLUSION

The above results strongly suggest that studies of network centrality and influence will be strengthened by accounting for the direction of network ties. In studies employing multiple regression and other multivariate techniques, the use of centrality scores rather than interlocks as variables might improve the predictability of models of corporate growth, profitability, debt-equity ratios, and other characteristics of corporations.

These findings also have implications for the debate over corporate control. The historical consensus is that financial corporations exercised tremendous power around the turn of the twentieth century. This view corresponds very closely with our data on directional centrality. A number of studies have documented the high centrality of financials in recent years (Dooley, 1969; Levine, 1972; Bearden et al., 1975; Mariolis, 1975; Sonquist and Koenig, 1976; Mizruchi, 1981), but systematic, independent evidence for their influence has been difficult to assemble. This study suggests that a centrality measure based on a network of strong ties weighted for directionality would prove useful in assembling this evidence.

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Letters to the Editor

FROM THE EDITOR

Letters to the Editor often help people unscramble confusing issues. Clarification occurs when writers reframe an issue, attach new literature to it, suggest alternative interpretations, uncover fallacies, place the issue historically, ground it with additional data, dissolve it into other issues, differentiate it into finer detail, in short, when writers put the issue into new contexts that increase our appreciation of its subtleties.

In an effort to focus part of the controversy about what the field of organizational studies is and should be, *ASQ* will publish more letters to the editor than it has in the past.

The ground rules are simple. Letters must be short (no more than 3–5 double-spaced pages), constructive, of general interest, well written, must contain *no* tables or figures, and, most important, must be tied directly to articles published in *ASQ*.

Letters will be reviewed by the editor. If a letter is not used, a postcard will be sent that says, "We have read your letter to the editor of *ASQ* and have decided not to publish it." If a letter is considered for use, a postcard will be sent alerting the author to expect an edited version. If the author accepts the editing, the letter will be printed as soon as possible. If the author does not accept the editing, the letter will be considered withdrawn.

We do not plan to spend extensive time on this section, since our first priority remains the production of well-crafted, full-length articles and succinct book reviews.

The editors of *ASQ* feel that those in the field need a place to hammer out some of the issues that now divide them. We will provide the place. We invite you to provide the trappings.

PAPERS FOR *ASQ* SPECIAL SECTION SOUGHT

When *Administrative Science Quarterly* began publication a quarter of a century ago, its first editor, James D. Thompson (1956:102), called for the "building of an administrative science." He argued that increased use of deductive and inductive methods of science to study administrative processes would develop general theories and a body of reliable knowledge to guide administrative actions. He saw pressures for immediately applicable results as inconsistent with these aims and therefore argued they should be reduced. Instead, he advocated focusing on relationships, use of abstract concepts, development of operational definitions, codification and analysis of existing relevant knowledge, study of the obvious as well as the unknown, and research based on theory. Jim was both prophetic and influential. The field of organizational studies — as it has come to be called — has grown steadily, and the pages of *ASQ* provide concrete evidence of growth and development in the use of the scientific techniques he advocated.

But perhaps after twenty-five years, the time has come to take stock and ask whether the promise he saw in using the scientific method has been fulfilled. Specifically, are our research efforts building an *applied* science, as Jim hoped? Are we developing reliable knowledge that is used to guide administrative actions? Who is using our knowledge of organizations and with what results? What are the implications of the present state of our knowledge and its utilization for the future conduct of organizational research?

To answer these questions, it seems appropriate that we should apply the techniques we have developed in studying others to study ourselves. In order to better understand how to make our knowledge useful, it may be necessary to become more self-conscious by, as Lindblom and Cohen (1979) suggest, examining and questioning what we are doing to produce and apply that knowledge.

ASQ would like to publish a special section on the utilization of organizational research to encourage such examination and questioning. We would like to be able to publish an array of papers that survey the current state of utilization in our field; analyze the roles, structures, and interorganizational arrangements that facilitate or inhibit the production and utilization of useful research findings; integrate what has been learned in other applied fields about utilization that is relevant to our own; develop models for doing and applying useful research; and present and analyze data related to the conduct or application of useful organizational research. We hope that contributions will move beyond narrow criteria of usefulness — exemplified by research targeted to solve specific problems that is subsequently applied or not applied — to consider indirect and lagged effects of organizational research in general. We also hope that many of the contributions will move beyond description and analysis to prescriptions for the future conduct of organizational research.

Janice M. Beyer has agreed to serve as guest editor of this special section, which will be published within the next 12 months. Prospective contributors are encouraged to contact Dr. Beyer (716/831–3362) for any further clarification of the topic.

Authors who wish to submit papers should be aware of the following:

1. The absolute deadline for submissions to *ASQ* is March 1, 1982. Manuscripts that arrive for the special section after March 1 will be returned unreviewed.

2. All papers — invited and uninvited — will be evaluated through the usual *ASQ* review process. Please indicate in the cover letter that you wish your manuscript to be considered for the special section.

3. Papers accepted for publication will be heavily edited to reduce repetition, to allow for a greater variety of compact statements, and to allow space for regular articles. The editing process will actively include the editors and authors as much as time will permit.

4. As a final guide, special value accrues to papers that identify a single issue and are concise.

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CALLS FOR PAPERS AND PROPOSALS

Western Academy of Management Meeting

The 1982 meeting of the Western Academy of Management will be held April 1–3, at the Broadmoor in Colorado Springs, Colorado. Conceptual papers, research reports, and proposals for panels, tutorials, or experimental sessions relating to all aspects of management are sought. Research and conceptual papers will be blind-reviewed. Authors are advised to submit four copies of papers, including the author's name, complete address, and a short abstract on a separate cover page. Interested persons are encouraged to submit fully developed proposals for panels, tutorials, or experimental sessions that may be either of interest to the entire membership or oriented toward one or more of the Academy's professional divisions. Four copies of proposals must be submitted. All papers and proposals must be submitted by November 15, 1981. Send all papers, proposals, and other communications to Professor Margaret Fenn, Graduate School of Business Administration, University of Washington (DJ–10), Seattle, WA 98195 (206/543–4568).

Midwest Division Academy of Management Conference

The 25th Annual Conference of the Midwest Division of the Academy of Management is scheduled for March 25–27, 1982, at the Hyatt Regency in Columbus, Ohio. Persons interested in presenting papers should send four copies of the papers, by October 23, 1981, to Arthur P. Brief, Graduate School of Business Administration, New York University, New York, NY 10006.

Southern Management Association Meeting

The 19th Annual Meeting of the Southern Management Association will be held November 11–14, 1981, at the Hilton Hotel in Atlanta, Georgia. This year's program will feature over 120 paper presentations, thematic panels, and seminars. Panels and seminars will deal with such topics as "Limitations of Small Business Research," "International Aspects of Organizational Behavior," "Learned Helplessness," and "Preventive Labor Relations in the Private Sector." The featured luncheon speaker will be William Ouchi (U.C.L.A.), author of *Theory Z*, which deals with Japanese business practices. For further information, contact Arthur G. Bedeian, Program Chair, Department of Management, Auburn University, Auburn, AL 36849.

CONFERENCE ON PERFORMANCE EVALUATION

On November 6–8, 1981, a conference on performance evaluation, sponsored by the Office of Naval Research and the Office of Personnel Management, will be held in Dallas, Texas. The conference is designed to involve theorists and researchers in discussions on new directions for future research. It will address four categories of issues: (1) philosophical, ideological, and societal issues; (2) organizational and suborganizational issues; (3) individual and social issues; and (4) methodological and measurement issues. Attendance is limited and is by invitation only. For application materials or more information, please contact Frank Landy, Department of Psychology, The Pennsylvania State University, University Park, PA 16802 (814/865–1617).

AMERICAN SOCIETY FOR HOSPITAL CENTRAL SERVICE MEETING

The 1981 Annual Meeting of the American Society for Hospital Central Service Personnel will be held October 12–14, 1981, at the Holiday Inn City Centre in Chicago, Illinois. The meeting will focus on quality assurance and its importance in central service. The educational sessions are geared to provide participants with skills and knowledge that will assist them in their efforts to assure quality in the course of the daily operations of their departments. Topics to be covered include "Quality Assurance in Sterilization," "Federal Update," "Manufacturers' View of the 80s," "Instrument Care and Handling," "The Managerial Role," "Stress Management," and "Quality Assurance for Central Service." For further information, contact Clarence W. Daly, Director, American Society for Hospital Central Service Personnel, 840 North Lake Shore Drive, Chicago, IL 60611 (312/280–6160).

ERRATA

On page 211, Table 2 of "Environmental Linkages and Power in Resource-Dependence Relations between Organizations" by Keith G. Provan (June 1980: 200–225) contains several errors. Beginning with row 9 (Years serving community), columns 6, 7, and 8 are not in their proper order. The correlations reported in column 6 should be listed under column 8, the old column 7 correlations should be listed under column 6, and the old column 8 correlations should be listed under column 7.

The Organizational Life Cycle: Issues in the Creation, Transformation, and Decline of "Organizations"

John R. Kimberly, Robert H. Miles, and Associates. San Francisco: Jossey-Bass, 1980. 492 pp. $19.95.

Kimberly and Miles have used their knowledge and interest in the birth, transformation, and development of organizations to pull together a very useful collection of chapters on the "organizational life cycle." The two principal authors each contribute two chapters (one of Miles' is co-authored with Randolph), a preface, and theme-setting pieces at the beginning of each of the three parts of the book. In the preface, Kimberly and Miles assert that their motivation in putting the book together is to increase the visibility of what are currently somewhat scattered efforts among a few researchers to explore patterns of organizational growth, evolution, change, and decline. Along with their desire to emphasize the content area of the book as worthy of further research, they also argue that the effective exploration of processes of birth, evolution, and decay will require more scholars to utilize longitudinal research designs and historical and processual forms of analysis. The book is not, therefore, just a collection of potboilers pulled out of filing cabinets or a set of articles published elsewhere (though two chapters have been published elsewhere), it is a coherently presented statement designed to help influence the field to move in a particular direction.

However, as some of the theories reviewed in the book suggest, before people will act and move in new directions they usually like to reflect on where they have been, where they see themselves now, and where they would like to be. This book offers some of that articulate reflection and will, I am sure, provide frames of reference and topic areas for those who wish to do longitudinal processual research but as yet do not have the confidence to move beyond reflection to action. But sound action in the research sphere requires not just an appreciation of what to study and why, but how. In their different ways and to different degrees, the authors of this book ask the important what and why questions but do not often enough ask the how questions. I am thinking here of how to tackle some of the difficult theoretical problems implicit in using biological metaphors and other broad theories of social process and how to set up and tackle some of the particular craft problems associated with longitudinal processual research in the content area of the book. Clearly there is a limit to what can be covered even in a book with 500 pages, and I make these points not as any fundamental criticism of what *The Organizational Life Cycle* provides but to encourage these and other authors with the beginnings of an agenda for the next book in this area.

After a scene-setting chapter by Kimberly, in which he points out some of the inadequacies of current organizational research and tries to justify the biological metaphor used in the book's title, the remaining 12 chapters of the book are organized around three themes. Part One discusses the creation of organizations, Part Two the transformation of organizations, and Part Three the decline of organizations. Most of the chapters contain both concepts and data. Nearly all the data were collected either in real time or in historical time. Some of the chapters move between the industry and the organizational level of analysis, some offer essentially structural analyses, others concentrate on intraorganizational processes. The Miles and Randolph chapter is a very well thought-through piece of writing based on a simulation using the Organization Game. The literature review chapter on organizational decline by Whetten ought to become a standard reference source for anyone starting research on declining organizations.

Van de Ven examined and reports on planning activities and structure design issues in the early life of 14 childhood development organizations. This chapter has all the flavor of cross-sectional mutton dressed up as processual lamb but is redeemed by a closing section that explores, more than most of the other chapters in the book, some of the alternative theoretical perspectives for examining issues of creation and transformation.

The Lodahl and Mitchell chapter reports on studies of new British universities. The valuable part of the chapter is a titillating and polemical discussion of institutional skills and processes and technical skills and processes. Walton's chapter draws on his important work as a researcher and consultant in what he calls high commitment work systems. The theory expressed in the chapter is outlined in a highly substantive way that has the advantage of specificity for those scholars interested in creating and building new forms of work organization but could be connected with advantage to more general theories of project development and innovation. The chapters by Pennings and by Brittain and Freeman remind us that we should not get fixated by the organizational level of analysis but should consider populations of organizations in varying contexts and industries as important areas in which to develop theory about creation and transformation processes. Ouchi's chapter asks us to reflect on the value of Williamson's work for the theme of the book. Tichy organizes his data about the birth and transformation of a New York health center rather uncritically around a phrase-cyclical model of change. While there is much talk of leadership in the book, Tichy is one of the few authors to explicitly draw on political behavior as a determinant of process outcomes. Niv uses data from two contemporary communes, one in the United States and the other in Israel, to ask questions about why communes so often disintegrate and fail.

Unlike most books of chapters by different authors this one has intellectual coherence and direction. For this, we must thank not only the writing skills of the individual authors but also the frame of reference and initiative supplied by the two principal authors. Kimberly and Miles have thought deeply enough about the content of the book and its relationship methodologically and theoretically to existing knowledge in this area to provide us with a book that can usefully act as a platform for further work. More importantly, perhaps, they have also made a public statement that they are prepared to attempt to lead the field in a particular direction rather than to act as procrastinators, doubters, or followers. The field of organization theory and behavior needs more books of this type at this time.

Admirable as this book is, both in pointing us towards future work and in providing a focus and platform for that work, the book's appearance also reminds us that there are important questions of theory and methodology that require explicit asking and answering if research that builds on this book is to be soundly based. In the main, the chapters in *The Organizational Life Cycle* do not tackle head-on the theoretical assumptions implicit in the language of the book. There is little discussion of the advantages and disadvantages of conceptualizing processes of development in terms of cycles, phases, epochs, dialectics, contradictions, and patterns of evolution. There are many adequate commentaries of these theoretical choices and their implication in sociology, social anthropology, political science, and economics. There are also lessons to be learned when scholars from those disciplines have attempted to use different ways of conceptualizing developmental processes in empirical research.

But the questions do not stop just with alternative ways of structuring and expressing theories of development. What are the implications for the research questions we ask, the kinds of findings we can report about seeking to explain birth, transformation, decline, and change in terms of individual and/or collective action, the vagaries of chance, the configurations of structures seemingly independent of purposeful social action, or the conflicts over power between interest groups? What are the alternative forms of processual analysis and explanation that we can use to study the transformation of organizations, and what role do structure and context play in providing both opportunity and constraint for the examination of process?

Aside from these what and how questions of theory and analysis, this book also invites another set of questions about how to design and conduct longitudinal research. What do we know of how to design single case study and comparative case study work using historical and real time data? What are the reliability and validity threats particular to this kind of work and how can we attempt to overcome them? What are the craft skills of conducting longitudinal processual research? How are we to combine the complementary advantages of processual and cross-sectional analyses within the same longitudinal design? The how of these craft skills is not to be found staring at us from the pages of books on research methodology. What theories in use have experienced qualitative researchers developed and how are the more effective aspects of these theories in use to be distilled and communicated to others?

A book can only be a moment in a process and few are even that. This book deserves to have its moment. It certainly has arrived at the right time and in a form to begin to influence the field. What is required now is further thought and action around the how-questions of conceptualizing structural and processual forms of analysis and a distillation and development of what we know and need to know of the craft skills in conducting longitudinal research in historical and real time.

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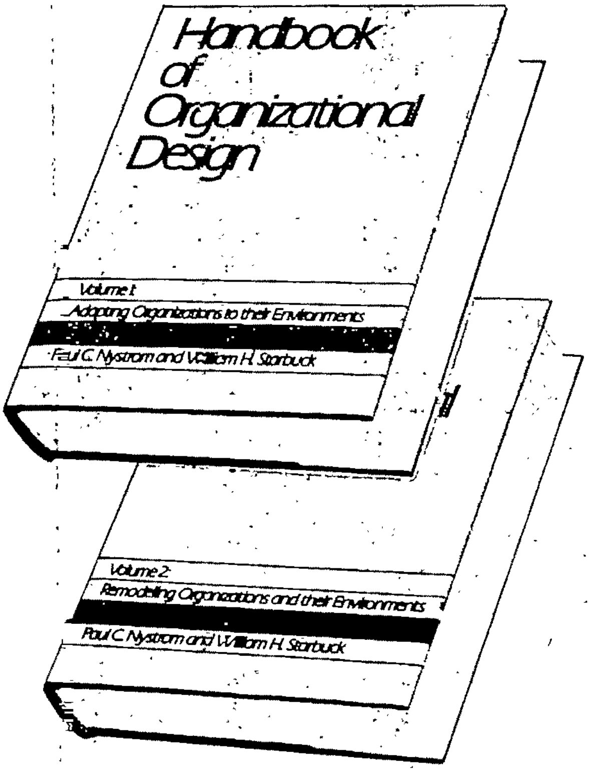
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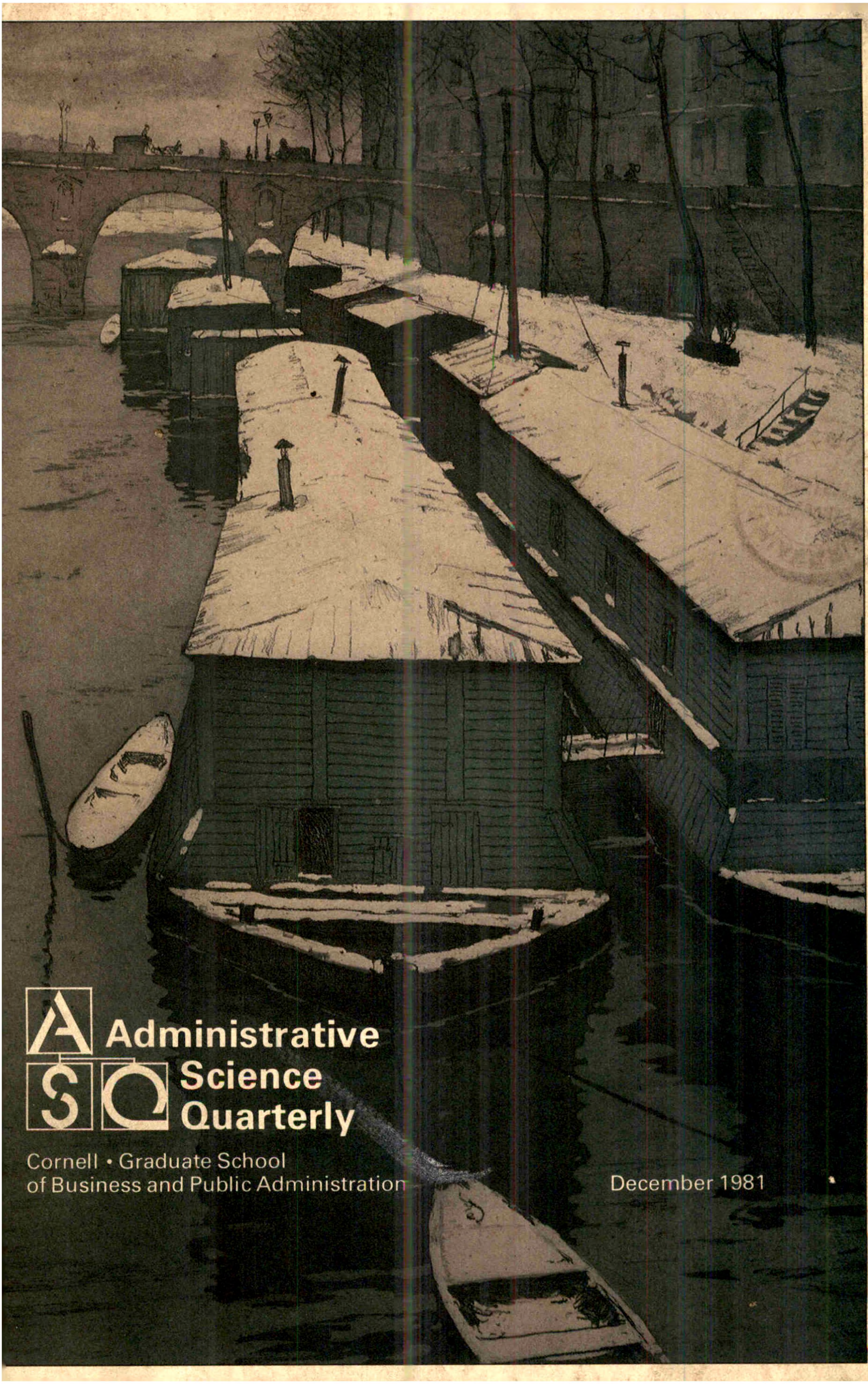

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Threat-Rigidity Effects in Organizational Behavior: A Multilevel Analysis

Barry M. Staw, Lance E. Sandelands, and Jane E. Dutton

This paper explores the case for a general threat-rigidity effect in individual, group, and organizational behavior. Evidence from multiple levels of analysis is summarized, showing a restriction in information processing and constriction of control under threat conditions. Possible mechanisms underlying such a multiple-level effect are explored, as are its possible functional and dysfunctional consequences.•

Recent economic trends have engendered interest in how organizations cope with adversity. Some researchers have taken an evolutionary perspective on this issue, examining the life span of a large number of organizations under varying environmental conditions (e.g., Hannan and Freeman, 1977; Aldrich, 1979). Others have taken a more policy-oriented perspective, examining how specific organizations have successfully or unsuccessfully adapted to threatening environments (Argenti, 1976; Rubin, 1977; Starbuck and Hedberg, 1977). This paper will also address the question of organizational adaptation in the face of adversity. However, rather than simply concentrating upon organizational actions in a social or market context, we will focus upon how adversity affects the adaptability of multiple layers of an organizational system.

At present, sociological theory notes that organizations attempt to cope with potential sources of adversity (Thompson, 1967; Pfeffer and Salancik, 1978) by adjusting their internal structure or by taking actions to enhance their position in the environment. Many of these market strategies and buffering techniques (e.g., Thompson, 1967) have a rather anthropomorphic quality to them and could be construed as the product of a policy-making group or even a single decision maker. While it can be argued that sociological rather than psychological theories are best equipped to explain macro-level phenomena, there are, as Miller (1978) has noted, many effects that appear to generalize across levels of analysis. The reaction of entities to threat or adversity may be just such a phenomenon. The anthropomorphic quality of macro-level propositions may be the product of parallels in the effect of threat upon individual, group, and organizational behavior. Anthropomorphism may also result from the fact that organizational actions are often initiated by individual and group forces, such that social and psychological effects indirectly influence organization-level phenomena.

Not only do current models emphasize organizational and not individual or group responses to adversity, but they also take a functional stance. It is commonly assumed that methods of coping with adversity are appropriate and increase the survival prospects of the organization (Thompson, 1967; Pfeffer and Salancik, 1978) or protect local interests (Cyert and March, 1963). What is missing is the identification of maladaptive or pathological cycles of behavior (Merton, 1967; Hall, 1976). This article will therefore examine evidence for a maladaptive tendency in reacting to adversity and will examine the case for this pathology from multiple levels of analysis.

THE THREAT-RIGIDITY THESIS

Many well-publicized corporate collapses can be viewed as failures to alter response in the face of environmental change.

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The Penn Central Railroad, for example, continued paying dividends until cash flow dried up completely (Altman, 1971); Chrysler Corporation, when faced with the oil crisis and rising gasoline prices, continued large (but efficient) production runs on its largest and most fuel-inefficient cars until inventories overflowed (*Business Week,* 1979; *Fortune*, 1979); the *Saturday Evening Post* continued to raise its prices as circulation dropped (Hall, 1976). At the individual level of analysis, some of these same pathologies may also exist. When placed in a threat situation, an individual's most well-learned or dominant response may be emitted (Zajonc, 1966), but this response may be grossly inappropriate if the task or learning environment has changed. Similarly, decision-making groups may reduce their flexibility under a stress situation, sealing off new information and controlling deviant responses (Janis, 1972).

As illustrated in these several examples, there may be a general tendency for individuals, groups, and organizations to behave rigidly in threatening situations. As we will explore in the review of several disparate literatures, there may be two types of effects. First, a threat may result in restriction of information processing, such as a narrowing in the field of attention, a simplification in information codes, or a reduction in the number of channels used. Second, when a threat occurs, there may be a constriction in control, such that power and influence can become more concentrated or placed in higher levels of a hierarchy. Thus, it is hypothesized that a threat results in changes in both the information and control processes of a system, and, because of these changes, a system's behavior is predicted to become less varied or flexible.

Data bearing on the threat-rigidity thesis will be presented from studies conducted at the individual, group, and organizational levels of analysis. Throughout the discussion, we will treat threat as an environmental event that has impending negative or harmful consequences for the entity (cf. Lazarus, 1966). However, in order to bring together sufficient literature to assess the threat-rigidity effect across multiple levels of analysis, it will be necessary to consider streams of research that overlap but do not match perfectly this definition of threat. Also, although we will consider information processing and control as determinants of rigidity, operationalizations of these variables will not be isomorphic across all levels of analysis. Such slippage in definitional precision will make our review conclusions more speculative than we would like, but this ambiguity is inevitable in searching for parallel and molar effects that span levels of analysis.

As outlined in Figure 1, the general thesis we will explore in this article is that a threat to the vital interests of an entity, be it an individual, group, or organization, will lead to forms of rigidity. It is futher proposed that threat-rigidity effects can be maladaptive. When the environment has changed radically, flexibility and diversity in response have survival value (Campbell, 1965; Weick, 1979). Thus, maladaptive cycles are predicted to follow from threats which encompass major environmental changes since prior, well-learned responses are inappropriate under new conditions. In contrast, when a threat does not involve major environmental change (e.g., when no basic causal relationships have been altered), rigidity in response may not be dysfunctional. A rigid, but previously successful response may

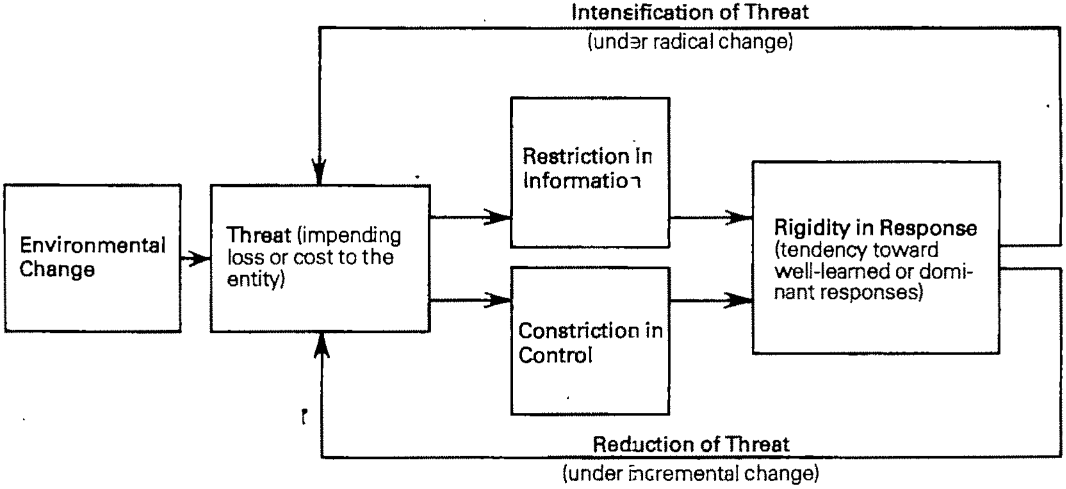
Intensification of Threat
(under radical change)
Environmental Change
Threat (impending loss or cost to the entity)
Restriction in Information
Constriction in Control
Rigidity in Response (tendency toward well-learned or dominant responses)
Reduction of Threat
(under incremental change)

Figure 1. Threat-rigidity cycles.

in fact be appropriate to a threatening situation that does not involve major changes. After reviewing the evidence bearing on the threat-rigidity thesis, we will return to this issue of the functional versus the dysfunctional nature of threat-rigidity effects.

INDIVIDUAL-LEVEL EFFECTS

The individual literature most relevant to threat deals with the effects of stress, anxiety, and arousal. Because threat is so frequently associated with these individual reactions, it has been used as the means to manipulate these variables. Studies frequently employ a threatening experience to alter states of stress, anxiety, and arousal, and then the effects of these manipulations are assessed upon individual cognition and behavior. Although stress, anxiety, and arousal are no doubt the immediate consequences of threat, we will consider them as virtual manipulation checks of whether a threatening stimulus has been presented.

Psychological Stress. The effects of psychological stress on individual behavior have received much attention (for reviews, see Janis, 1958; Lazarus, 1966; Appley and Trumbell, 1967; Sarason and Spielberger, 1975; McGrath, 1976; Beer and Newman, 1978). While the construct of stress has been interpreted in many divergent ways (e.g., stressful behaviors, adverse stimuli, and aspects of the social or physical environment), the research that is most relevant to threat involves the manipulation of an experimental context. Psychological stress has been manipulated by administering performance-failure feedback on preceding experimental tasks (Postman and Bruner, 1948; Cowen, 1952a, 1952b; Osler, 1954; Smock, 1955), by excess pacing of experimental tasks and time pressure (Lazarus and Eriksen, 1952; Castaneda and Palermo, 1955; Palermo, 1957), by threats of electrical shock (Pronko and Leith, 1956), and by varying the formality, warmth, and friendliness of experimental settings (Cowen, 1952a, 1952b).

Effects of stress relevant to the threat-rigidity hypothesis can be found in three streams of research. In the area of perception, research indicates that psychological stress interferes with the ability of subjects to identify and discriminate among visual stimuli (e.g., Postman and Bruner, 1948; Postman and Brown, 1952; Smock, 1955). Under stress, individuals perceive unfamiliar stimuli in terms of previously held "internal hypotheses" about the identity of stimulus objects, whereas persons not subjected to stress conditions are better able to identify and discriminate unfamiliar stimuli.

In the area of problem solving and learning, studies have used Luchins' (1942) water jar test to examine whether stress induces problem-solving rigidity. This test requires subjects to develop strategies for solving an arithmetic problem, and rigidity is measured by adherence to a previously learned solution, even when that solution is no longer appropriate for the problem at hand. Subjects in stress conditions have been found to be less flexible in their choice of solution methods than nonstress subjects (Cowen, 1952a, 1952b).

Finally, in the area of motor performance, research has shown an interaction between stress and training. Trained subjects in a stress condition perform better than subjects in nonstress conditions, but untrained subjects in a stress condition perform less well than nonstress subjects (e.g., Castaneda and Palermo, 1955; Pronko and Leith, 1956; Palermo, 1957). Some authors (e.g., Pronko and Leith, 1956) have concluded that psychological stress leads to behavioral-response rigidities, but, in the case of the trained subjects, the rigidified response is appropriate for task performance. These findings also support the Hull-Spence theory of motivation in which psychological stress may act to increase drive level and stimulate dominant habituated responses (cf., Taylor and Spence, 1952; Farber and Spence, 1953; Spence and Farber, 1953). Task performance is enhanced in cases in which dominant responses are performance-relevant but hindered in the cases in which dominant responses are irrelevant or detrimental.

Anxiety. The relationship between anxiety and behavior can be categorized into two substreams of research. On the one hand are correlational studies relating measured states of anxiety (e.g., Taylor's Manifest Anxiety Scale) to various performance indicators. For example, studies of visual discrimination and learning have found that highly anxious subjects are less sensitive to visual stimulation (Goldstone, 1955) and are less discriminating of visual detail (Korchin, Singer, and Ballard, 1951; Korchin and Basowitz, 1954). On the other hand, many studies of anxiety have used experimental manipulations similar to studies of stress (e.g., electric shock and performance-failure feedback). This body of research indicates that anxiety, like psychological stress, interferes with visual discrimination✓ (Eriksen and Wechsler, 1955), motor performance involving✓ vigilance (Wachtel, 1968), and intellectual test performance (Mandler and Sarason, 1952; Sarason, Mandler, and Craighill, 1952; Wine, 1971).[1]

Physiological Arousal. Although arousal is a physical rather than psychological state of the organism, the concepts of stress, anxiety, and arousal are complementary aspects of human functioning (Schlosberg, 1954; Duffy, 1962). During periods of threat, individuals become physiologically activated in addition to experiencing psychic stress and anxiety. In fact, it is likely that arousal is ultimately responsible for the behavioral effects observed under conditions of stress and anxiety, although there is still considerable debate about whether arousal precedes or follows from more cognitively based emotional reactions (Schachter and Singer, 1962; Zajonc, 1980).

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[1] The fact that psychological stress and anxiety have been identified with a common set of experimental operations suggests a problem of discriminant validity (Campbell and Fiske, 1959). However, we cite the stress and anxiety literatures separately because they are treated separately within psychology, and because we are concerned primarily with the general effects of threat rather than the distinctions between these two constructs.

Arousal researchers have investigated many of the same aspects of human functioning as those working in the areas of stress and anxiety. Frequently studied are the effects of arousal upon perception (Duffy, 1932, 1962; Bacon, 1974; Pallak et al., 1975), learning (Yerkes and Dodson, 1908; Berry, 1962; Obrist, 1962; Kleinsmith and Kaplan, 1963; Eysenck, 1975), and motor performance (Thorner, Gibbs, and Gibbs, 1942; Huxtable, White, and McCartor, 1946; Stennett, 1957). As summarized by Easterbrook (1959), the effect of arousal upon perception is to narrow the range of cues processed by decreasing sensitivity to peripheral cues. In terms of learning and performance, arousal may also reduce flexibility and induce responses that are well-learned or habituated (see Duffy, 1962; Broadbent, 1971; Eysenck, 1976; for reviews).

Disaster Research. While research on stress, anxiety, and arousal has been primarily laboratory-based, the largest source of field data related to threat comes from disaster-research studies. In the early 1950s, the U.S. government sponsored studies of communities that experienced tornadoes (Wallace, 1956), floods (Danzig, Thayer, and Galanter, 1958), major coal mining accidents (Beach and Lucas, 1963), and other disasters. While this literature provides some insight into the reactions of individuals in threat situations, the evidence is often anecdotal and speculative. Nonetheless, from the available case studies and clinical analyses of behavior in disaster situations, two themes are prevalent. First, most authors agree that the primary psychological effects of crisis are to create feelings of stress and anxiety in affected individuals (Bettelheim, 1943; Boder, 1954; Janis, 1954, 1962; Menninger, 1954; Glass, 1955; Wallace, 1956; Wolfenstein, 1957; Withey, 1962; Beach and Lucas, 1963). Second, the anxiety and stress brought on by a crisis elicits behavioral responses of withdrawal (Menninger, 1954; Glass, 1955), reductions in critical information processing (Menninger, 1952; Danzig et al., 1958), and constriction in behavioral responses (Menninger, 1952; Glass, 1955). In a review of the disaster studies, Withey (1962: 118), for example, concluded that the anxiety individuals experience in crisis situations leads to "a narrowing of the perceptual field and a limitation of the information that can or will be received" and that a more persistent threat may lead to even "greater constriction of cognition, rigidity of response, and primitive forms of reaction."

Summary of Individual Effects

We have only briefly reviewed the extensive body of research that relates to individual responses in threat situations. However, because the convergence of data across the research areas is so strong, it is possible to construct a summary model. Figure 2 depicts relationships between the theoretical constructs of stress, anxiety, physiological arousal, and cognitive and behavioral effects. Three aspects of this model are central: (1) the link between threat situations and psychological stress and anxiety; (2) the nature of cognitive manifestations of stress/anxiety/arousal; and (3) the link between cognitive man-

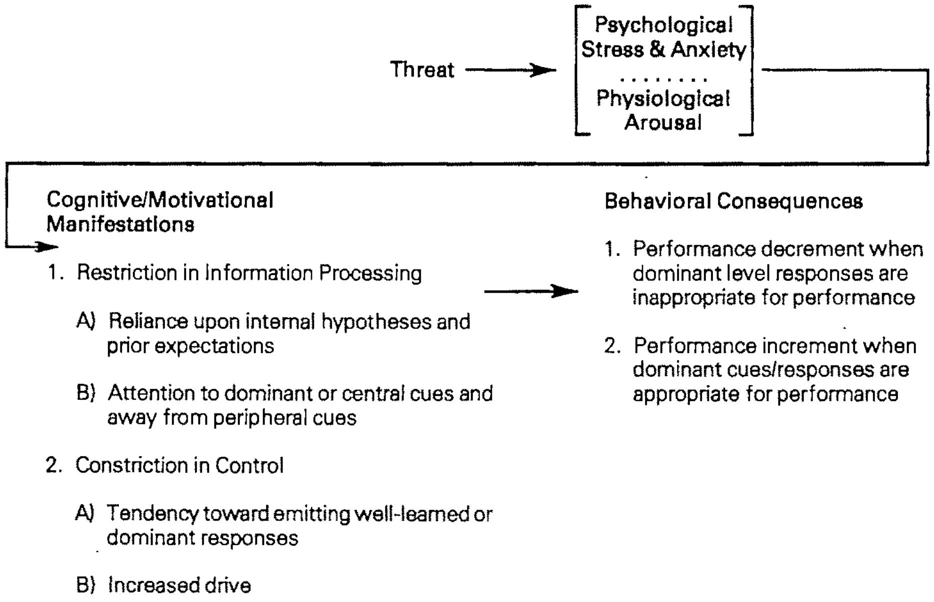
Threat
Psychological Stress & Anxiety
Physiological Arousal
Cognitive/Motivational Manifestations
1. Restriction in Information Processing
A) Reliance upon internal hypotheses and prior expectations
B) Attention to dominant or central cues and away from peripheral cues
2. Constriction in Control
A) Tendency toward emitting well-learned or dominant responses
B) Increased drive
Behavioral Consequences
1. Performance decrement when dominant level responses are inappropriate for performance
2. Performance increment when dominant cues/responses are appropriate for performance

Figure 2. A model of individual response to threat.

ifestations of stress/anxiety/arousal and properties of individual behavior.

As shown in Figure 2, it is posited that threat leads to psychological stress and anxiety. This linkage is explicit in the disaster literature since symptoms of psychological stress and anxiety are found to be widespread in communities afflicted by disaster. This linkage is also implicit in the experimental literature, because manipulations such as electrical shock, failure feedback, excessive time pressure, and threatening ambience are unpleasant, personally aversive events.

A second important feature of the model depicted in Figure 2 concerns the cognitive and motivational manifestations of psychological stress, anxiety, and arousal. The effects of these factors can be delineated between information and control processes. In threat situations, restrictions in information have been shown to result from tendencies on the part of individuals to emphasize prior expectations or internal hypotheses about their environment (Postman and Bruner, 1948; Postman and Brown, 1952; Smock, 1955), and from tendencies to narrow attention to include dominant cues and exclude peripheral cues (Easterbrook, 1959; Wachtel, 1968; Wine, 1971; Eysenck, 1976). Likewise, constrictions in control correspond to the tendency of individuals to emit dominant, well-learned or habituated responses in threat situations (Beier, 1951; Cowen, 1952a, 1952b; Farber and Spence, 1953; Schaffer, 1954; Castaneda and Palermo, 1955; Eriksen and Wechsler, 1955; Pronko and Leith, 1956; Palermo, 1957; Zajonc, 1965; Pallak et al., 1975).

A final aspect of the model that bears discussion is the link between the cognitive and behavioral consequences of threat situations. In the disaster literature, anecdotal evidence has suggested that threatened individuals may fail to heed warnings or follow directions (Wolfenstein, 1957) and may even "freeze up" or fixate in their behaviors (Glass, 1955). These observations are consistent with findings from experimental psychology that suggest that psychological stress, anxiety, and arousal often result in poor task performance and a tendency to persevere in well-learned courses of action. Significantly, however, the psychological literature cautions that the performance effects of stress, anxiety, and arousal are not general. Whether an individual performs a task well in a threat situation depends on performance relevant cues being central in the environment (as opposed to peripheral) and on performance relevant responses being dominant for the individual. This of course means that threats resulting from common or familiar problems may induce effective coping responses from individuals, while threats arising from radical environmental change may bring on a maladaptive reaction. This also means that practice or drill may not lead to effective coping mechanisms, except when the parameters of threat situations are well known or when the drills can, in fact, train individuals for cognitive flexibility under adverse circumstances.

GROUP-LEVEL EFFECTS

Threats to the interest and purposes of groups often occur, some so severe as to cause the breakup of a collectivity or loss to each of its members. For this reason, there may be parallels between the individual-level effects of threat and effects on the group level of analysis. However, because group research has not directly investigated this issue, it is necessary to examine several seemingly divergent subareas in order to explore such parallels.

The Effects of Threat upon Group Cohesiveness

One of the long accepted hypotheses of group behavior is that an external threat draws group members together and increases group cohesiveness. Much of the research supporting this contention comes from studies of intergroup conflict. The best known and one of the earliest illustrations of this effect was Sherif's boys' camp studies (Sherif and Sherif, 1953; Sherif et al., 1961). When two groups were placed in a competitive situation, the sociometric choices of group members shifted to an intragroup basis, with very few affective or social linkages persisting across the competitive groups. The rivalry between groups appeared to increase the liking and social bonds within each group and such positive intragroup affect was directly associated with intergroup hostility. Although some researchers (e.g., Rabbie and Wilkins, 1971; Rabbie and Huggen, 1974) have contested these findings on the grounds that they result from a relatively uncontrolled field experiment, laboratory experiments in which intergroup rivalry is manipulated also support Sherif's early conclusions (see Dion, 1979, for a review).

Although competition between groups has been found to increase intragroup cohesiveness, this does not mean that adversity always draws group members together. When two groups compete for resources, the losing group may suffer a decrease in intragroup cohesiveness, while the winners may increase their cohesion further (Wilson and Miller, 1961; Ryen and Kahn, 1975; Worchel, Lind, and Kaufman, 1975). Thus, competition that threatens the loss of resources can lead to increased cohesiveness while the *actuality* of such a loss may lead to dissension. It would seem, therefore, that intergroup rivalry may focus attention on intragroup relationships and make group membership more salient, but it can only assure a relatively short-term increase in cohesiveness. More sustained cohesiveness may result from *successful* competition.

The literature on group problem solving also addresses the intragroup consequences of group success or failure, although these data are derived from task performance rather than competition with a rival group. A large number of studies have found success on a group task to lead to positive affect toward other members of the group while task failure reduces intragroup cohesiveness (see Shaw, 1976; Zander, 1979; for reviews). There are some exceptions to this general finding, but few studies have demonstrated that group failure leads to increased cohesion, and such increases could be viewed as a short-term reaction rather than a long-run consequence of failure.

In summary, an outside threat is posited to lead to an increase in the salience of intragroup relationships and a decrease in intergroup ties. This increased focus upon intragroup membership and processes will generally also lead to an increase in cohesiveness and liking for other group members. However, we would hypothesize that increases in cohesiveness may be short-lived if a group fails to meet outside challenges, either in terms of an intergroup rivalry or a problem facing the group. In the case of sustained and clear-cut failure, the increased focusing upon in-group process may only serve to exacerbate a loss in cohesiveness. On the other hand, a group which is successful, or at least not failing to meet an outside challenge, may sustain cohesiveness at a high level.

The Effect of Threat upon Group Leadership and Control

Although group membership by itself can be stress reducing (Schachter, 1959), an external threat facing a group would be expected to raise anxiety about the attainment of group goals and individual interests as they relate to collective achievements. One way to meet such an outside challenge or reduce the threat might be increased reliance upon a group leader.

The effect of external threat upon leadership is not straightforward. Worchel, Andreoli, and Folger (1977) found that members of competing groups identified fewer members as leaders than did members of cooperating groups, implying a centralization of authority under threat. However, in Hamblin's (1958) research, groups were exposed to an outside threat or crisis, and he observed the replacement rather than a strengthening of existing group leadership. The threat in Hamblin's study consisted of radical changes in the rules of an experimental game, making it impossible for a group to succeed on the task or even to predict what behaviors were necessary for group success. In this experiment, there was a tendency for those who were initially most influential to lose some of their power and for those who were initially second in group influence to attain the leadership role. Other research by Hollander and his associates showed that a failure experience increased the influence of an elected leader but not that of an appointed leader (Hollander, Fallon, and Edwards, 1974). However, even for elected leaders, continued failure caused a significant erosion in their influence over time.

Threat-Rigidity Effects

From existing data, it can be hypothesized that external threat focuses the attention of group members upon the actions of a leader and others high in influence. If external threat is translated into a clear-cut failure experience, the leader may be blamed and his or her influence reduced. However, replacement of the group leader does not necessarily mean a decentralization of power within the group. If anything, an external threat probably increases reliance upon those high in influence, and, as Hamblin (1958) has shown, failure may cause those who already possess substantial influence (e.g., second in power) to gain in power, while those with the least initial influence continue to rely on others.

Research on leadership and group threat appears to contradict observations that support for leaders increases under threatening situations. For example, it has been hypothesized that support for a national leader increases during times of war (Hertzler, 1940; Korten, 1962) and that the influence of labor leaders increases during a strike against management (Walton and McKersie, 1965). How are these observations reconciled with the available literature on group behavior?

Some of the confusion on this topic results from the lack of distinction between external threat and failure. In real-world settings, threat may persist for a long period of time before failure information is received, allowing a leader to take action or mobilize efforts before any negative consequences have materialized. In contrast, most laboratory experiments have manipulated failure information so that the erosion of collective goals or interests has already occurred. A second difference between laboratory studies and real-world observations has to do with the external nature of a threat. In experimental studies using failure experience, it is not often clear whether a threat to collective welfare is due to an external force or internal incompetence. The leader may therefore be justifiably blamed when a group fails or cannot solve a problem. In contrast, many of the most salient examples of threat in the real world (e.g., warfare) are clearly introduced by an external agent. Leaders are rarely blamed for provoking a war or precipitating a strike, although they are sometimes accused of not taking strong enough action to alleviate the outside threat. Thus, support for group leaders in real-world settings may stem from the external attribution of a setback as well as the anticipation of eventual goal achievement. In contrast, laboratory evidence of derogation of the leader may stem from the internal attribution of threat and the anticipation of failure.

The Effect of Threat upon Pressures toward Uniformity

Early theoretical work by Festinger (1950) posited that pressures toward uniformity arise because group members perceive uniformity as necessary to move toward a collective goal. Festinger hypothesized that groups will exert pressure upon deviants in order to reach consensus on opinions and beliefs and that pressures for uniformity will increase as a collective goal increases in importance or as group members become increasingly dependent upon the group. Thus, as a logical extension, it would seem that a threat to group interests would also heighten pressures toward uniformity.

Festinger posited that when individuals deviate on important issues the group will increase communication with and exert pressure upon the deviant to change. However, if the deviant fails to come into line with the rest of the group, communication may become sharply reduced and he or she may become excluded from important group tasks. In an elegant empirical study, Schachter (1951) validated Festinger's predicted changes in communication with deviants and showed how pressures for uniformity can lead to exclusion of deviants from vital group functions. In a cross-cultural study, Schachter et al. (1954) also showed that pressures for uniformity increase as a group goal is threatened and that such pressures increase as the magnitude of threat or value of the goal increases.

Janis' (1972) historical analysis of top-level decision-making groups can also be interpreted in terms of the effect of threat upon pressures for uniformity. Janis posited that many of the worst decisions by the U.S. government (e.g., the Bay of Pigs invasion, the decision to cross the 38th Parallel during the Korean War, and the escalation of the Vietnam War) were a product of "groupthink." As defined, groupthink is a syndrome of process characteristics present in highly cohesive policy groups. But at the heart of the groupthink syndrome are the outcroppings of pressures toward uniformity, such as direct influence upon group members whose opinions deviate from consensus beliefs, self-censorship of deviant beliefs by group members, exclusion of divergent information or possible critical input to the group, and a shared illusion of unanimity concerning central beliefs or collective judgments. While Janis (1972) portrays these processes as a product of group cohesiveness, they can be viewed simply as indications of pressures for uniformity. Moreover, in each of the cases used by Janis to illustrate groupthink, an external threat was present. Thus, it may be prudent to consider threat as the variable that initiates pressures for uniformity rather than group cohesiveness, as originally formulated by Janis. Adding some support to this position is an experiment by Flowers (1977) in which increased group cohesiveness did not adversely affect decision processes as predicted by Janis' model.

Summary of Group Effects

Figure 3 outlines some of the principal effects of an external threat upon group processes. When a threat has been attributed to an external source and it is thought likely for a group to successfully meet the threat, then increased cohesiveness, leadership support, and pressure for uniformity is predicted. The group will seek consensus and in so doing will generally support the policies or position of the existing group leadership. Reaching consensus, however, will often entail the restriction of information, ignoring divergent solutions and downplaying

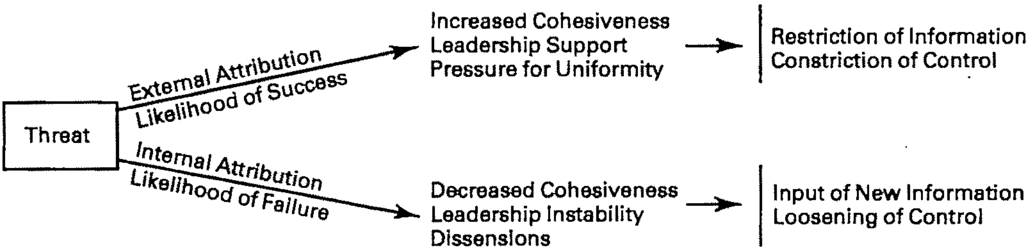

Figure 3. A model of group response to threat.

the role of deviant positions. Consensus seeking also involves a constriction of control, such that the opinions of the dominant members may prevail and their influence may become more centralized. Such changes in information and control processes may, of course, lead to faulty group decision making.

If a threat is attributed to internal deficiencies or the group is perceived as unlikely to succeed, then neither cohesiveness nor consensus are likely to follow. Failure experiences breed dissensus and leadership instability, both of which can be viewed as providing new information or a loosening of control. What frequently follows from such instability is the appearance of new leaders or group consensus, which promises a turnaround of group fortunes and/or success against the external threat.

ORGANIZATION-LEVEL EFFECTS

The study of threat to organizational systems can draw upon several research literatures. Research on natural disasters has been extended to the analysis of organizational responses to crisis (e.g., Brouillette and Quarantelli, 1971; Turner, 1976). Likewise, political scientists have been concerned with how governmental bodies react to national threats and how crisis decision making may deviate from a rational-choice model (Snyder and Paige, 1958; Hermann, 1963; Holsti, 1971; Paige, 1972). Finally, of late there has been increasing attention devoted to decline processes in public organizations, brought on by budgetary cutbacks in universities (Rubin, 1977; Manns and March, 1978) and governmental agencies (Mitnick, 1978; Bozeman and Slusher, 1979). In the private sector, there has been a similar concern with industrial decline or retrenchment (Khandwalla, 1972; Schendel, Patton, and Riggs, 1976; Starbuck and Hedberg, 1977; Starbuck, Greve, and Hedberg, 1978; Whetten, 1980). In many cases, severe resource constraints have created a situation in which the welfare or viability of an organization is threatened.

Crisis or Threat?

Much of the organization-level work on threat has made use of the theoretical construct of crisis. The most prevalent definition is Hermann's (1963) classification in which a crisis is said to occur when three conditions are present: (1) there is a major threat to system survival; (2) there is little time to react; and (3) the threat is unanticipated. This three-part scheme has endured within this literature, even though empirical support for the scheme has been limited. For example, perceptions by U.S. State Department officials of the characteristics of a crisis did not reveal such a tripartite classification (Lentner, 1972). Notably missing from the Foreign Service officers' perceptions of crisis were opinions that a threat must be unanticipated to constitute a crisis. Even Hermann's (1965) own research did not confirm the anticipation dimension of the definition of crisis. As a result, some researchers have substituted the idea that a crisis must be ill-structured rather than unanticipated (e.g., Turner, 1976), or that a crisis is perceived when there is a disruption for which no specific plans have been made (Billings, Milburn, and Schaalman, 1980). Meanwhile, other researchers have attached the crisis label to a range of phenomena such as information overload (Meier, 1962) and financial adversity (Rubin, 1977; Starbuck and Hedberg, 1977). For simplicity, we will avoid any syndrome-like definition of crisis and will instead deal with the effects of threat. In our view, threat is probably the driving force behind most of the events that the term *crisis* attempts to explain. Although time pressure or anticipation may interact with threat in affecting actions, most research has shown a simple, direct effect of the extent of potential loss upon the perception of a crisis (e.g., Lentner, 1972; Billings, Milburn, and Schaalman, 1980).

The Effect of Threat upon Informational Processes

In research on decision making during international conflicts it has been posited that a threat to security results in a restriction of the number of alternatives considered by policy makers (Snyder and Paige, 1958; North et al., 1963; Holsti, 1964). The reason for a restriction in alternatives is not yet clear. Smart and Vertinsky (1977) suggested that fewer sources of information are consulted in a crisis, which explains why there are fewer alternatives available. In contrast, Williams (1957) proposed that new information that cannot be easily assimilated to information already possessed is assigned a low value. The net effect of this tendency is to restrict alternatives to those that are similar to information that the organization already possesses and, as Paige (1972) observed, for decision makers to rely heavily on past experience or prior knowledge.

As we noted in our discussion of individual-level effects, there is a tendency for individuals to identify a dominant and familiar precept in a threat situation and then to assimilate new information into it. This tendency has also been observed by researchers who have sought to understand governmental decision making under threat. Holsti (1971), for example, noted that policy makers tend to adopt a single approach to problem solving and then supplement this mode of problem solving by collecting objective information supporting it. He further noted the tendency for policy makers, confronted by threat, to simplify and stereotype assessments of the situation. In a similar vein, Lasswell et al. (1949) found an effect of external threat upon the simplification of language. By content analyzing editorials in prominent newspapers from various countries, he found that when these countries were confronted with serious international threats, the editorial content of newspapers tended to become simplified and repetitious. Suedfeld and Tetlock (1977), in a content analysis of public speeches and diplomatic communications, also found a reduction in cognitive complexity in conflict situations leading to the outbreak of war.

Although an external threat appears to produce simplification and a reduction in alternatives considered by policy makers, it does not appear to reduce search behavior. The available data on search activity indicate that search for information follows a wave pattern over time. Initially, at the detection of a threat, more information is sought to confirm the presence of the threat. This tendency was vividly illustrated by officials at Pearl Harbor prior to the Japanese attack. When these officials first learned of the possibility of an attack, they searched intensively for information to confirm the existence of the threat (Wholstetter, 1962; Paige, 1972). However, as the threat became a reality, the search for information appeared to decrease. This reduction in search could have been due to the overloading of communication channels that often occurs at the onset of threat. Holsti (1964), for example, found evidence of information overload in the crisis preceding World War I. The central decision units were physically overloaded, and, hence, information-search attempts were blocked. North et al. (1963) found a similar occurrence in their study of the crisis preceding World War I, as did Williams (1957) in his study of communication patterns in a natural disaster.

Search for information may reintensify as soon as a decision has been made on how to cope with a threat. However, the type of information sought is not information on alternatives nor information about the threat, but instead is support information confirming policy choices that have already been made. For example, Paige (1972), in his study of Korean and Cuban decisions, found that when confronted with crisis decisions, decision makers solicited advice from subordinates, presumably only to confirm their decision outcomes or preferences. Similarly, Rubin (1977) found an increased search for information by members of university departments who were faced with severe financial-cutback decisions. She attributed the increase in information search to both the decreased tolerance for error in cutback decisions and the need to justify decisions, once they are made. One might interpret the behavior of the secretary of state during the Cuban missile crisis in a similar way. Larson (1963), for example, noted that the U.S. secretary of state communicated with over 75 governments during the Cuban missile crisis, and these communication efforts may have been intended to collect information supporting the U.S. position.

Universities ✓

The preceding discussion suggests that an external threat can have a somewhat paradoxical impact on information processes within an organization. As we have noted, search for information may change as a threat develops, from an initial flurry when a threat is recognized, to a low point as channels become overloaded, and on to a second peak as decisions are confirmed or implemented. However, throughout these changes in information search, the number of genuinely new or novel alternatives considered by the organization may still be relatively low. Even when search is increased, information received is likely to be similar to that of the past, due to heavy reliance on standard operating procedures, previous ways of understanding, or communication that is low in complexity (Starbuck, Greve, and Hedberg, 1978).

Control Processes

A second major effect of threat appears to be a mechanistic shift (Burns and Stalker, 1961) in which there is increased centralization of authority, more extensive formalization, and standardization of procedures. Although many researchers have noted these organizational reactions to threat (Hermann, 1965; Smart and Vertinsky, 1977; Bozeman and Slusher, 1979), very limited attention has been paid to why the effects have been observed. It seems logical that when threat confronts an organization, a major concern would be the enhancement of control and coordination of organizational action. In general, as the importance of decisions increases, they are made at progressively higher levels within an organizational hierarchy, presumably because top-level decision making is less likely to differ from the core values or goals of the organization (Kanter, 1977). Similarly, increased formalization and standardization of procedures can insure coordination of organizational action when lower-level participants must carry out the decisions of others (Katz and Kahn, 1978). Thus, because threat makes salient the possibility of substantial error or loss, we should expect increases in both organizational coordination and control.

The centralization of authority in response to crisis is the most widely acknowledged aspect of the mechanistic shift. Hermann (1963) argued that increased centralization is manifested by contraction in authority, reduction in the number of decision participants, and decision making at higher levels of the organization. In his simulation studies, he found no actual reduction in the number of decision makers during a crisis decision (although contraction possibilities were limited in his experimental groups of five persons), but he did find a perceived reduction in the number of participants. In case studies of international crises, Paige (1972) and Holsti (1971) did find a reduction in the size of decision bodies during times of threat. Likewise, the data of Starbuck, Greve, and Hedberg (1978) in a case study of a declining firm, Rubin's (1977) research on responses to budget cutbacks in universities, and Khandwalla's (1972) research on organizational response to malevolent environments all show increasing centralization in times of threat. Pfeffer and Leblebici (1973) found that a stressful environment with a high degree of market competition, coupled with a rapid degree of environmental change, was associated with taller organizational structures and increased review and control of decision making.

An interesting exception to the centralization effect was found by Brouillette and Quarantelli (1971) in their investigation of how organizations deal with natural disasters. They found that divisions or units of public-work organizations became more autonomous during a threat period, decisions being made without consultation with higher officials. However, within each of these autonomous units an informal administrative core emerged to make decisions, suggesting that debureaucratization may be accompanied by increased centralization *within* each of the units. The key point may be that the centralization may vary according to whether the threat affects a subunit or an entire organization.

As an extension of the Brouillette and Quarantelli findings, one might hypothesize that a threat may force a control response that results in the strengthening of tightly coupled links within organizations and the dissolution of weak links. Therefore, in a diversified or decentralized organization, a threat may induce a control response that dissolves weak links to the top while strengthening intraunit links, giving the appearance of a debureaucratization process. In contrast, within a functional or traditionally structured organization, threat may stimulate a control response that strengthens links to the top while dissolving weak links between departments or units, producing a more obviously centralized structure. This hypothesized strengthening of strong links and weakening of loose links between departments and levels of an organization would be analogous to the observed dominant-response effect (Zajonc, 1965) at the individual level of analysis.

Other indications of a mechanistic shift in response to threat include an increased use of formalized procedures and greater standardization of activities. In Rubin's (1977) study of responses of a university to budget cutbacks, departments tended to use more explicit decision-making criteria and systemized their allocation criteria. Similarly, in a study of corporate turnaround strategies (Schendel, Patton, and Riggs, 1976), firms made profit responsibilities more explicit in response to profit decline. Also, Khandwalla (1972) found that organizations, when faced with adverse environmental conditions, increased the use of standardized and routinized practices. Finally, a laboratory simulation by Bourgeois, McAllister, and Mitchell (1978) showed that business students actually preferred mechanistic over organic structures when acting as a manager facing turbulent environments.

Thus, threat appears to be accompanied by a change in organizational structure that resembles a mechanistic shift. This change is evident in increased centralization, formalization, standardization and routinization. From available evidence at the organizational level, the shift to a more rigid structure seems to be due to decision makers' attempts to enhance control so as to insure that organizational members act in a concerted way in meeting a threat situation.

Dominance of Efficiency Concerns

There is some support for the predominance of efficiency concerns in organizations during times of threat. Efficiency concerns are manifested in the tightening of available budgets, increased emphasis on cost cutting, and intensification of efforts to insure accountability. These effects are often brought about by a severe decline in performance and a reduction in slack resources within the organization. For example, Starbuck and Hedberg's (1977) case study data indicate that decline is accompanied by a high premium placed upon efficiency measures. The two companies in their sample used temporary expedients such as cost cutting, budget tightening and the restriction of marginal activities to deal with severe financial adversity. Similarly, Schendel, Patton, and Riggs (1976) documented the increased use of firings and greater budget and cost control as measures employed by companies faced by persistent decline in market performance. Rubin's (1977) study of universities plagued by budget cutbacks indicates a similar tendency with respect to the dominance of efficiency concerns. In universities faced with financial constraints, allocation criteria for resource distribution become highly salient. Finally, Bozeman and Slusher (1979) noted that in times of sustained resource scarcity in the public sector there is increased technological efficiency and increased pressures for accountability which may, in turn, eliminate the use of creative or novel strategies in decision making.

Summary of Organized Effects

Figure 4 summarizes the predicted effects of threat on organization-level phenomena. As shown in the figure, threat has generally been conceived as a result of an adverse condition in the environment, such as resource scarcity, competition, or reduction in the size of the market. The consequences of threat on the organization can be placed in three groups. First, due to an overload of communication channels, reliance on prior

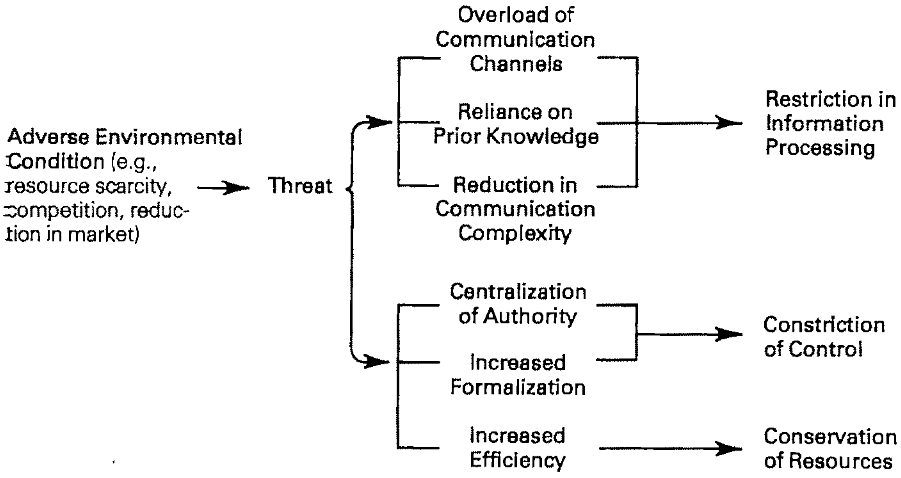
Adverse Environmental Condition (e.g., resource scarcity, competition, reduction in market)
Threat
Overload of Communication Channels
Reliance on Prior Knowledge
Reduction in Communication Complexity
Restriction in Information Processing
Centralization of Authority
Increased Formalization
Constriction of Control
Increased Efficiency
Conservation of Resources

Figure 4. A model of organizational response to threat.

knowledge, and a reduction in communication complexity, there may be a restriction in the information-processing capacity of the organization. Second, due to a centralization of authority and increased formalization of procedures, there may be a constriction in control. Finally, there may be increased efforts to conserve resources within the system through cost-cutting and efforts for greater efficiency.

TOWARD A MULTILEVEL THEORY

In a review of the evidence, the threat-rigidity thesis finds support at multiple levels of analysis. At the individual level, there are strong indications of constrictions in information processing and behavioral response in the face of threat. At the group level, there is evidence of similar effects when a threat is perceived as external to the group and when there is some expectation of successfully resisting the threat. Finally, at the organization level, there is evidence of a mechanistic shift, restricting information and moving control to higher levels in the system. Although the concepts and operationalization of effects vary both within and especially between levels of analysis, it does appear possible to draw some generalizations from the data.

At present, most of the evidence underlying the threat-rigidity thesis is interpreted in psychological or sociological theories at either micro- or macro-levels of analysis. For example, there are delimited or "middle-range" theories (Merton, 1967) about how individuals react to stress, how groups deal with failure experiences, and how organizations cope with adversity. The advantage of these delimited models is that they allow a rather fine-grained analysis of a particular subject group and capitalize on preexisting disciplinary boundaries. The primary disadvantage of these delimited models is that they are level-specific and tend to restrict our ability to see general patterns across social entities.

A Systems Approach

Given the generality of threat-rigidity effects, a systems-theory explanation would seem appealing. One could treat each entity, be it an individual, group, or organization, as a relatively autonomous system attempting to cope with its own idiosyncratic environment. The relatively consistent findings at the three levels of analysis would thus support a general explanation of reactions to threat, in language that is devoid of psychological or sociological terms but is instead translated into the description of general social systems (e.g., Miller, 1978).

As an example of a systems explanation, one could utilize a fundamental principle of cybernetics to show how rigidity can result from threat. First, as outlined by Weiner (1948) and Ashby (1956), the number of output discriminations of a system (i.e., its behavioral repertoire) is limited by the variety of information inherent in its input. Second, as is well known (e.g., Arrow, 1974), there are costs associated with the gathering, use, and maintenance of information by a system. Thus, under a threat situation, a system is likely to economize in information processing by decreasing the use of nonessential peripheral channels and by reducing the number and complexity of information codes employed. Such a reduction in complexity and variety of input may, therefore, lead to a concomitant reduction in system response capability or a narrowing in the behavioral repertoire.

Using the systems metaphor, it can also be seen how the effect of threat upon internal control mechanisms may induce system rigidity. Under threat, the necessity of system response is great, and input processes may be subordinated to output and control processes. Information channels and codes that are normally used for inputting information from the environment may become occupied by signals aimed at controlling and coordinating the behavior of system subunits. Again, the effect of increased control may be to decrease discriminability and thereby narrow the behavioral repertoire.

By mixing the systems approach with a social-evolutionary perspective (e.g., Campbell, 1965; Weick, 1979), it is easy to see how pathological responses can develop in the face of environmental change. When a threat occurs, the entity focuses attention on the source of danger, economizing on nonrelevant input and processing functions and responding with well-learned or salient behavioral responses. While such a response pattern works well for threats of a known or repeated nature (for which a well-learned response is likely to be correct), it is less appropriate for threats of unknown dimensions. A change in the basic patterning or cause-effect relations in an environment requires diversity in input mechanisms and variety in response. For example, when market parameters change or task and learning environments are radically different, the entity cannot adapt by narrowing its input and response repertoire. As noted by advocates of social-evolutionary models (e.g., Campbell, 1965; Weick, 1979; Aldrich, 1979), only variety in input and diversity in response insures survival under conditions of radical change.

Cross-Level Effects

As we have noted, disciplinary theories (e.g., psychological or sociological models of stress and coping) can provide an in-depth analysis of single-level phenomena, while a systems approach can address generalities that appear across levels of analysis. What is missing in both these perspectives, however, is an understanding of effects that cross levels of analysis. Are there, for example, individual effects that affect group processes under threat or group processes that affect organizational responses to threat? Such questions are difficult to answer but may in fact explain much of the consistency of threat-rigidity effects that appear to cross levels of analysis.

Individual-Level Effects in Group Settings

When individuals are brought together to reach a decision about an issue (e.g., in a policy-making group), the inputs or knowledge brought to the decision are, in large part, the cognitions and information of individuals. Although group interaction may become a new input of its own, the abilities and skills of group members are crucial to group performance (Shaw, 1976). Even some of the group processes themselves may depend on the array of individual characteristics brought into the group setting. Polarization effects, for example, depend upon the diversity and extremity of opinion before a group is convened, rather than upon a processing feature such as strength of argumentation or diffusion of responsibility (Lamm and Myers, 1978). Therefore, if individuals restrict their cognitions and narrow their response repertoire in threat situations, we should expect similar group-level effects. Rather than treating group rigidities as created only by social process, at least some of this apparent group-level effect may thus be explained by cognitive changes in the individuals composing the group.

Group Effects in Organizational Settings

Janis (1972), in his work on "groupthink," has characterized many decisions and actions in organizations as the product of policy-making groups. For top governmental decision making, there are formal groups (e.g., The National Security Council) ready for use in threat situations, and there are many similar counterparts in industry (e.g., weekly meetings of the president and executive vice presidents). Given the increase in affiliative tendencies in threat situations (Schacter, 1959) and the objective need to coordinate policy, it is likely that groups will be convened to deal with a threat situation. Thus, any rigidities generated by group process under threat may also be manifested in organizational actions.

Individual Effects in Organizational Settings

Although groups are often convened to deal with a crisis situation, many major decisions still originate with administrators acting alone or in consultation with very few others. For example, when organizations seek control in threat situations, individual actors are the ones who clamor for influence, and they are the ones who refer crucial decisions up the hierarchy. A serious threat to an entire organization also challenges the interests of individual actors and may exacerbate the power differential between subunits and the administrators who head them. Such a threat may result in more centralized control, not because of an organizational process or formation of a particular coalition, but because top level administrators demand more control in coping with the situation.

Organizational members can be viewed as having central or peripheral interests in the welfare of an organization and the subunit in which they are employed. Members who tie their own personal welfare to that of the organization can therefore be expected to act for the organization in relatively the same way as they would for their own idiosyncratic interests. Immersed in their roles as agents of the organization, some top administrators may even act to defend the interests of the collectivity when their own personal welfare is not immediately obvious. In contrast, middle-level administrators frequently express more loyalty to the organizational subunit or work group, while the interests of the lowest-level members of the organization are often peripheral to the organization. Thus, by viewing organizational action as a function of the welfare of individual actors (cf. Olson, 1968), it is easy to see why macro-organizational behavior often so closely resembles individual coping responses. Organizational actions in the environment (e.g., reduction of uncertainty and threat) are predicated upon the interests of top-level administrators, which are, in turn, nearly isomorphic with the welfare of the organization as a collectivity. Because lower-level personnel have more heterogeneous interests, it is also easy to see why a threat situation instills greater coordination and control. Unreliable or divergent behavior is viewed as something to be avoided by top-level administrators whose interests are more directly threatened.

The Dual Nature of Threat-Rigidity Effects

Throughout our discussion of the effects of threat, we have focused on possible maladaptive reactions by individuals, groups, and organizations. We have emphasized that restrictions in information and control may hinder adaptation to new environmental conditions, thereby bringing more substantial losses to the entity. However, it can be argued that the maladaptive nature of threat-rigidity effects are limited. For example, dysfunctions may be most graphically demonstrated in laboratory settings since, in those situations, experimenters can abruptly change causal rules so that prior behavior is no longer appropriate. In other environments, because causal relationships are more stable, it may be functional to rely on well-learned theories and action sequences that have been reinforced in the past.

The key to whether a threat-rigidity effect is functional or not may rest on the nature of the threat itself. In order to accumulate evidence, we necessarily treated threat as a broad construct that included any impending negative consequences for an entity. However, it may be important to distinguish between cases in which the level of known variables has changed and those in which basic causal relationships have been altered. As shown in Figure 1, either incremental or radical environmental change can cause a threat to an entity. But, depending on the source of threat, response rigidities can serve to either reduce or intensify the threat. The net results, of course, can be either a functional adaptation to the environment or a maladaptive cycle of threat-rigidity effects.

As an example of the dual nature of threat-rigidity effects, it is interesting to reconsider what happens to organizations in times of resource scarcity (Staw and Szwajkowski, 1975). The general reaction of organizations to increase efficiency and control (Whetten, 1980) would certainly be functional when the parameters of the environment are well known and coping mechanisms clear. However, when adversity results from a radical change in the environment, it may be dysfunctional for an organization to tighten controls and press efficiency. In their discussion of the reaction of public agencies to budget restraints, Bozeman and Slusher (1979: 346) well summarized the problem:

> Scarcity-induced stress causes organizations to behave as if complex, dynamic and interrelated environments are in fact simple, static and unrelated. These behaviors include narrower domain definitions, reductions in labor intensive technology, increasing specializations of technologies and more mechanistic structures with tighter administrative control. The public organization's turbulent environment is essentially demanding an increased domain. However, the organization's response is to constrict its domain.

Therefore, although an organization's reaction to scarcity can insulate it against immediate failure, increased efficiency and control can prove maladaptive when scarcity is symptomatic of more fundamental change. In essence, doing better at what one already knows is, at best, a mixed blessing.

CONCLUSION

We have attempted in this article to bring some widely varied literature to bear on a rather simple but important problem. Although threat-rigidity effects are not always dysfunctional, many systemic breakdowns (Hall, 1976) do appear to fit a threat-rigidity cycle. In a sense, threat-rigidity effects may be a two-edged mechanism in which both the survival and extinction potentials of organizations are amplified. Thus, there is a clear need for research that can specify conditions under which restrictions in information and constriction of control will prove functional or dysfunctional. There is also room for much more research on the specification of individual, group, and organizational effects of threat, as well as on effects that may cross levels of analysis. Our integration of prior findings and theoretical speculations, therefore, should be viewed as simply a starting point rather than a summary of work on this topic.

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Perceptions of Organizational Effectiveness over Organizational Life Cycles

Kim S. Cameron and David A. Whetten

Among the problems in the literature on organizational effectiveness are the over-reliance on researcher imposed criteria of effectiveness and the tendency to measure perceptions of effectiveness at only one point in time. In this study, we examine the changes that occurred in ratings of effectiveness by organizational members as their organizations developed through various life cycle stages. Using 18 simulated organizations, we tracked the changes that occurred in perceptions of effectiveness related to different domains of activity and different levels of analysis. We found that, as the organizations developed, the importance of effectiveness in acquiring inputs gave way to the importance of effectiveness in producing outputs. Individual effectiveness became less important over time while organizational effectiveness became more important. We draw implications for the use of different models of organizational effectiveness in future research.

The concept of organizational effectiveness is central to the investigation of organizational structures, processes, and outputs. Indeed, most research conducted at the organizational level of analysis is linked, at least implicitly, to the concept of effectiveness (Goodman and Pennings, 1980). The obvious inability of researchers to agree on the definition and operationalization of this construct is, therefore, ironically noteworthy. Historically, researchers selected measures of effectiveness opportunistically. That is, they operationalized the construct based on the availability of data, and then justified the decision by referencing isolated empirical studies that used similar measures. The resulting research literature is a plethora of unintegrated and noncumulative findings (Steers, 1977). This paper argues that the empirical and rhetorical confusion evident in this area partially stems from the fact that the debate about the proper measurement of effectiveness has deflected attention from the need to examine the meaning of effectiveness to organizational members.

The equally chaotic nature of the theoretical literature on organizational effectiveness stems from authors' arguments over which of the competing definitions and models of effectiveness should be adopted universally. The debates between advocates of the goal model (Etzioni, 1964; Price, 1972), the resource-control model (Yuchtman and Seashore, 1967), and the internal processes model (Bennis, 1966; Nadler and Tushman, 1980) are now legendary. In addition to this disagreement over which domain of organizational activity represents the legitimate focus of attention for effectiveness studies, authors have disagreed over the appropriate level of analysis for measuring the construct. For example, Scott et al. (1978) and Cummings (1980) argued for measuring effectiveness at the individual level, Van de Ven and Ferry (1980) and Pennings and Goodman (1977) argued for the subunit level, Price (1968) and Yuchtman and Seashore (1967) for the organizational level, and Hirsch (1975) and Pfeffer and Salancik (1978) for the organizational-environment level. These debates over domains of activity and levels of analysis have at times appeared so bewildering and futile that some authors have suggested that the concept of effectiveness has no inherent

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meaning and should be abandoned as a research topic (Hannan and Freeman, 1977b; Goodman, 1979).

Two recent trends in organizational theory provide some promise for resolving the empirical and theoretical confusion surrounding this construct. The recent emphasis in organizational theory on language and meaning (Pondy and Mitroff, 1978; Daft and Wiginton, 1979; Weick, 1979) suggests the need to rely less on investigator-imposed definitions of effectiveness and more on the meaning that different groups of organizational members place on this concept. Further, the recent emphasis on organizational life cycles suggests that the judgments and perceptions of organizational members change at different stages in the organization's development (Kimberly and Miles, 1980).

In this paper, we focus attention on these two deficiencies in the literature on organizational effectiveness: (1) the over-reliance on researcher-imposed criteria of effectiveness, and (2) the tendency to measure perceptions of effectiveness at only one point in time. We first briefly review the subjective understanding and life cycles contributions to organizational theory and examine the appropriate uses of simulations in organizational research. Then a study of organizational effectiveness across stages of the organizational life cycle, using simulated organizations, is presented.

Interpretation and Sense Making

During the past decade, several authors have focused on the processes by which organizational members enact and interpret their environments (Weick, 1977; Brown, 1978; Salancik and Pfeffer, 1978). According to these authors, organizational realities are not independent of human consciouness but are, instead, constituted intersubjectively. Through ongoing social organizing processes, a common informational environment is created that enables participants to make sense out of their unique experiences. This social context also provides cues regarding the relative importance of environmental stimuli. Individuals therefore focus their attention selectively on certain features of the environment and, as a result, store more information about those features. When asked to evaluate their environment, individuals emphasize features about which they have the most information (Taylor and Fiske, 1978).

Treating organizational reality as the product of social enactment has important research implications. For example, it brings into question the legitimacy of the researcher's operationalizations of constructs that organizational members use to evaluate their experiences. It argues, instead, that investigators should elicit from organizational members the meanings they attach to these constructs. We would not go so far as to argue that the social construction of reality in one organization is so unique that it is impossible to generalize. But we do propose that there are significant differences in the social environments constructed at different life-cycle stages and at different hierarchical levels in the organization. To test the validity of this assertion, we designed the current study to determine whether the meaning that organizational members attach to criteria of effectiveness shifts over time and across organizational groups.

Life Cycles

In recent years, emphasis has been placed on the need to study the early development of organizations. Stinchcombe (1965), Kimberly (1980), Miles and Randolph (1980), and others argued that the initial "imprinting" establishes parameters that limit both the degree and the direction of future development. Furthermore, several authors have proposed that, by observing the development of organizations through life-cycle stages, it may be possible to predict the major problems, decisions, and opportunities that an organization will have to face, and to provide some suggestions for appropriate responses (Greiner, 1972; Torbert, 1974; Lyden, 1975; Lavoie and Culbert, 1978; Adizes, 1979; Kimberly, 1979; Miles, 1980). However, most of the literature on organizations is based on static assessments of mature organizations. As Miles (1980:45) observed:

> We know almost nothing about either the evolution of structures and processes or the patterns of learning and decision-making that occur as organizations attempt to move from creation to maturity.

In a review of nine models of organizational life cycles, Quinn and Cameron (1980) identified four common stages of development among those models.[1] Organizations in each stage are typified by a particular mix of major characteristics. Organizations begin in a stage, labelled "creativity and entrepreneurship," in which marshalling resources, creating an ideology, and forming an ecological niche are emphasized. The second stage, the "collectivity" stage, includes high commitment and cohesion among members, face-to-face communication and informal structures, long hours of dedicated service to the organization, and an emerging sense of collectivity and mission. The organizational emphasis is on internal processes and practices, rather than on external contingencies. In the third stage, "formalization and control," where procedures and policies become institutionalized, goals are formalized, conservatism predominates, and flexibility is reduced. The emphasis is on efficiency of production. The fourth stage emphasizes "elaboration of structure" where decentralization, domain expansion, and renewed adaptability occur, and new multipurpose subsystems are established. Quinn and Cameron (1980) point out that these four stages are probably applicable only to the early stages of development of organizations. After the "elaboration of structure" stage, development is more likely to occur metamorphically than sequentially.

Shifting Criteria of Effectiveness over Life Cycle Stages

That emphases change during the life cycle suggests that participants perceptions and interpretations of organizational effectiveness also may change.[2] But if we are to discover how these perceptions shift, salient features of organizational effectiveness must be identified. That is, it is necessary to organize the criteria of effectiveness into meaningful categories. Cameron (1981), Goodman and Pennings (1980), and others have identified the organization's domain of activity as one important organizing variable. One useful typology of domains is Thompson's (1967): input activities, technological and transformation processes, and output and production activities. These domains of activity appear to correspond with commonly used criteria of organizational effectiveness (Cameron, 1981). Furthermore, a different domain of activity seems to predominate in each stage of development. In the first stage (creativity and entrepreneurship), marshalling resources, achieving a niche, and establishing priorities all appear to be directly associated with the domain of input activities. In the second stage (collectivity), emphases on face-to-face communication, on cohesion and a sense of family, and on internal processes all seem consistent with the domain of transformation processes. In the third stage (formalization and control), formalizing organizational goals and emphasizing efficient production seem to be associated with the domain of output and production activities.

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[1] The life-cycles models reviewed were those by Downs (1967: 296–309), Lippitt and Schmidt (1967), Scott (1971), Greiner (1972), Torbert (1974), Lyden (1975), Katz and Kahn (1978), Adizes (1979), and Kimberly (1979).

[2] Several organizational researchers, in fact, acknowledge that the criteria of effectiveness utilized by organizational members change over time. For example, Kaufman (1975), in writing about organizational evolution, argued that the chief reason for organizational demise is that changes in the internal or external organizational environments cause established criteria for self-evaluations to become outdated. Similarly, Greiner (1972) suggested that when organizational members focus on effectiveness criteria that were relevant in a past stage of the organization's development, the organization begins to stagnate and decline. Greiner suggested that in each of his proposed stages of development, different criteria become pertinent as indicators of success.

The associations between life-cycle models and Thompson's activity domains lead us to expect that, during the early stages of development, organizational members will report that effectiveness in the domain of input activities is most important. Emphasis on effectiveness in this domain should give way to an emphasis on effectiveness in the domain of transformation processes, as the organization matures. Subsequently, effectiveness in the processes domain is expected to be seen as less important than effectiveness in output and production.

Some life-cycle models suggest that the important levels of analysis also change over time (cf., Greiner, 1972; Kimberly, 1979), and it is generally acknowledged in the literature that a change in the level of analysis alters the definition and referents of organizational effectiveness (Goodman and Pennings, 1980; Van de Ven and Ferry, 1980). We therefore expect that the salience attached to the organization's hierarchical levels by the organization's members will shift over life-cycle stages, although no empirical work has addressed this issue.[3] In sum, it is expected that, as organizations mature, changes will occur in perceptions of organizational effectiveness in domains of activity and in hierarchical levels.

Up to now, we have referred to organizational members as if they were an undifferentiated whole. Obviously they are not. Several researchers have pointed out that individuals occupying different positions within an organization and performing different tasks use different criteria for evaluating the organization (Dearborn and Simon, 1958; Porter, 1958; Ghiselli, 1973; Bouchard, 1976).[4] In general, however, almost all research on effectiveness has focused on a single constituency. Consequently, few studies have examined whether systematic differences in rating effectiveness exist among different groups. In this study, we investigate both the extent to which different groups inside the organization hold different perceptions of organizational effectiveness and how those perceptions change over organizational life cycles.[5]

Problems in Assessing Life Cycles

The major problem with investigating changes in the perceptions of effectiveness over organizational life cycles is that it requires tracking organizations over long periods of time. Longitudinal research is therefore rare, primarily because researchers have difficulty mustering the necessary resources. There are, however, some alternative methodologies for tracking organizational life cycles that require fewer resources and less time. One is historical analyses (e.g., Pettigrew, 1979; Miles and Cameron, 1981). In these analyses, organizational life cycles are inferred from information about organizations' past behavior. The weakness of this approach is that it is difficult retrospectively to identify distinctive life-cycle stages and to determine the specific activity domains and levels of analysis that were judged to be most important by an organization's members during a given developmental stage.

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[3] One reason that changes in the importance of effectiveness at different levels of analysis is an important issue is that achieving high effectiveness on one level of analysis may reduce high effectiveness on another level of analysis as an organization develops (e.g., collective bargaining may improve effectiveness on the individual level but may decrease effectiveness on the organizational level). Furthermore, Hannan and Freeman (1977a, 1977b) pointed out that failure in organizations frequently is the result of the organization's emphasis on the wrong level of analysis (i.e., a level in which the important behavior does not take place).

[4] This has become a salient issue in the debate over the proper measurement of organizational effectiveness. Writers such as Cameron (1978), Thompson (1967), and Pennings and Goodman (1977) have suggested that members of the dominant coalition (i.e., major decision makers and policy setters) should be used as sources for judging organizational effectiveness. Van de Ven and Ferry (1980) assumed that the most knowledgeable informants about the processes, structures, and effectiveness of an organization are the individuals engaged in the organization's daily production tasks. Miles (1980) and Nord (1982) emphasized constituencies residing outside the organization's boundaries.

[5] We have chosen to focus on internal constituencies of organizations for three reasons. (1) These groups can translate their definitions and interpretations into organizational action (Schneider, 1982). (2) It is easier to delineate and to control for their membership, whereas the boundaries of external constituencies frequently are very ambiguous. (3) Most of the previous research has focused on organizational members, but not on their changing perceptions of effectiveness over time. We do not assume that this is the most important constituency for organizations, however, and we hope that future research will examine both external and multiple internal constituencies.

Another approach to the study of organizational life cycles is to observe simulated organizations in a compressed time frame. There is some evidence to suggest that even though simulated groups and organizations have a definite termination point, and even though developmental stages are speeded up, these organizations may still progress through the same stages as their real-life counterparts (Neal, 1978). Furthermore, it has been argued that simulations reliably produce many of the dynamics of behavior operative in organizations (Cangelosi and Dill, 1965; Weick, 1974; Streker, 1976; Miles and Randolph, 1979).

Organizational Simulations

Organizational simulations are representations of the behaviors, processes, and outcomes occurring in real organizations. They are essentially "automated theories" or sets of assumptions about organizational behavior that are acted out. Conclusions and implications are drawn regarding what organizations would be like if the assumptions and results were found in reality. Cohen and Cyert (1965:306) suggested that "the assumptions need not be exact representations of reality, but they may instead be reasonable abstractions of reality." That is, asking whether or not the simulation matches reality is not as important as asking whether the processes observed in the simulation are reasonable compared to those observed in reality. Simulations focus more on concerns of internal validity than of external validity.

In 1965, after enumerating various advantages of organizational simulations for fundamental research on organizations, Cohen and Cyert (1965) expressed confidence that a great deal of research using simulations would be forthcoming. This has not been the case. Organizational theorists and researchers have largely eschewed laboratory methods and organizational simulations; they have favored descriptive studies of real organizations instead. Studies of external validity have predominated over the less complex, fine-grained analyses of organizational processes and outcomes in artificial settings. In fields such as economics and operations research, however, simulations have been used as a foundation for theoretical development.

Simulations are of two general forms: (1) behavioral simulations, in which individuals interact with one another in a game situation, and (2) computer-based simulations, in which individuals interact with a computer and make choices in response to certain programmed feedback. When much is known about the processes or outcomes in question, computerized simulations are appropriate. When little is known about the processes or outcomes, or when they are inherently complex or ambiguous, behavioral simulations should be used (Inbar and Stoll, 1972). Simulations differ from laboratory studies in that, in simulations, fewer variables are controlled for, and some of the richness of context is allowed to influence perceptions, behaviors, and processes. Therefore, extrapolation from simulations to real organizations is less problematic than is extrapolation from laboratory studies to real organizations (Ray and Duke, 1968; Raser, 1969).

The advantage of using simulations when studying organizational effectiveness over time, level, domain, and constituency is that the issues in question can be isolated and investigated directly. For example, the very difficult task of identifying all strategic constituencies for an organization and determining their relative power and bargaining positions (as suggested by Pfeffer and Salancik, 1978, and by Goodman and Pennings, 1980) is unnecessary with a simulation, which allows the identification and investigation of a limited set of constituencies that are by design the most important and relevant to the organization. Certain processes or relationships that may be unobservable in real organizations can be studied by simulating an organization. For example, changes in domains of effectiveness over time are difficult to observe in real settings, but simulations allow effectiveness to be tracked in a compressed time frame as organizations develop.

Cohen and Cyert (1965) and Inbar and Stoll (1972) suggested that the major result of research using organizational simulations is the generation of hypotheses that can be tested in real organizations. One researcher has argued that time spent in research activities in organizations is expensive and precious, and that simulations can be used to generate hypotheses, so that research time spent in organizations can be used more efficiently.[6] Pruitt (1975) suggested that simulations are more appropriate for studying internal validity (i.e., conceptual development) than are surveys or field experiments, in which external validity is the major consideration. In light of these arguments, and because our objective is to critique the literature on organizational effectiveness rather than to develop propositions for managerial practice, we deem that a behavioral simulation is appropriate for this study.

METHODOLOGY

"The Organization Game," developed by Miles and Randolph (1979), was the simulation employed in this study.[7] It is a simulation of a small production organization made up of four physically separated divisions. Each division consists of two departments or subunits. Before participating in the game, participants are required to become familiar with the rudimentary structure and rules of play as provided in the "Participants' Manual." The structure and operation of the game are as follows.

Primary Tasks. The simulated organization has two main tasks: solving anagrams to produce words and solving word puzzles to produce sentences. The coordinator of the simulation "sells" anagrams and puzzles to certain departments or subunits in the organization. These must be solved within one session of play.

Timing. The simulation is run in successive sessions of approximately one hour each. (The sessions in our simulation ranged from 45 minutes to 75 minutes.) At the beginning of each session, resources are distributed to the organization depending on how well the organization is performing (see below). During the approximately 10-minute break between each session, organizational performance is calculated, new resources are allocated by the coordinator, and questionnaires are completed by the participants.

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[6] Gerrit Wolf, in personal communication with first author.

[7] Detailed instructions for the design and operation of the simulation can be obtained from Miles and Randolph's (1979) "Instructors' Manual," and from Randolph and Miles (1979).

To decrease termination artifacts and to make the developments of the organizations more real, participants were not told when the simulation would end. In every case, the simulation was terminated unexpectedly in the middle of a round of play.

Resources. The organization's resources consist of "communication tickets" that are expended when an individual communicates with someone in another division; "base wage tickets" that represent a subsistence salary that every participant must earn each session; and "organization dollars" that are used to purchase anagrams, puzzles, and additional base-wage or communications tickets, to hire new employees, to pay salaries, to invest, and so on. The organization begins with a certain minimum level of resources, and members can earn more resources each session by performing their primary tasks effectively, by investing, and by keeping all participants employed. The coordinator uses a set schedule of payment in distributing resources.

Structure. Each department or subunit has an assigned function. One department is assigned simple, routine tasks (i.e., solving anagrams). Two other departments are assigned more complex, coordinated tasks. These two departments, which are in separate divisions, must solve complex puzzles. Each of the two departments has only half of each puzzle. Five other departments are assigned staff or support functions including personnel management, internal auditing and accounting, information processing, management consulting, and entrepreneurial activities. All together, there are three production departments and five staff departments. Some participants are randomly assigned at the outset of the game to be "managers" of each department, but no overall management structure for the organization is provided. All of the other participants begin without task assignments; each must be hired and given a job by one of the department managers.

Participants

The simulations were conducted independently at two universities, the University of Wisconsin–Madison and the University of Illinois–Champaign-Urbana. At the University of Wisconsin, 150 graduate students and upper-division undergraduates in business administration participated in the nine-hour simulation. Approximately 38 students were assigned to each of four separate organizations. Slightly more than six sessions were run, followed on the same day by an hour of debriefing and three days later by a two-hour comparative analysis.

The simulation was conducted at the University of Illinois one semester later in order to provide a larger data base (i.e., more organizations) and to increase the reliability of the findings. Approximately 500 undergraduate students were assigned to 14 organizations (average $N = 35$), and slightly more than five sessions were run. The authors served as process observers in the organizations, and trained graduate assistants coordinated the simulations.

The Instrument

At the end of each session at Wisconsin, and after sessions 1, 3, and 5 at Illinois, participants completed a questionnaire that assessed their perceptions of different aspects of organizational effectiveness across four levels of analysis. Several weeks later, each participant also handed in a written analysis of his or her experience, which was used to help interpret the questionnaire data. Valid responses to the questionnaire were obtained from 583 participants, a 90 percent response rate.

In the questionnaire, participants were asked to rank order the relative importance they attached to criteria of individual effectiveness, departmental or operating-unit effectiveness, divisional effectiveness, and organizational effectiveness. The criteria for the individual level of analysis were obtaining personal resources and power, effectively accomplishing assigned tasks, and maintaining good relations with other organizational members. The criteria for the departmental, divisional, and organizational levels included obtaining resources, coordination and functioning smoothly, and producing high amounts of output.

Participants also were asked to rank order the relative importance of effectiveness in three domains of activity for the four levels of analysis: obtaining inputs and resources, maintaining satisfactory internal processes and coordination, and producing desirable levels of output. Input activities were specified as obtaining organizational dollars, communication tickets, base wage tickets, and organizational power; process activities were characterized as having smooth coordination, little strain and conflict, and good interpersonal and interunit relations; output activities were specified as having high levels of task completion within the allowed time, and financial growth.

Other items on the questionnaire asked the participants to rate their own performance and the performance of their department, division, and organization (high effectiveness = 1, low effectiveness = 7), and to rate the extent to which they perceived complexity, uncertainty, and turbulence in their environment (high = 1, low = 7).

RESULTS

Results from the two studies were highly consistent. That is, ratings by participants in Wisconsin were similar to ratings by participants in Illinois. Test-retest reliabilities were computed by comparing the ratings between the two groups of the importance of effectiveness in different levels of analysis. When the Wisconsin responses were treated as T_1 and the Illinois responses as T_2, the test-retest reliability coefficient was .99. For ratings of the importance of effectiveness in different domains of activity over time, the test-retest reliability coefficient was also .99. Similarly, a test of the similarity of the two covariance matrices (of Wisconsin ratings over time and Illinois ratings over time), using Box's M statistic, indicated that a statistically significant difference did not exist. Therefore, because of the similarity of ratings of the two groups, the data sets are discussed in aggregate in this paper.

Development of the Organizations

At the outset of the simulations, the participants reported a high degree of ambiguity and uncertainty. Interpersonal, interdepartmental, and interdivisional relationships in the organizations had to be established, and much effort was focused on initial organizing activities. No overall management structure existed in any of the organizations for at leat three sessions.

Each organization developed some unique features during the six sessions. For example, several organizations formed organization-wide coordinating bodies or elected a top-management group. A few of the organizations formed employee unions and bargained with managers (department heads) for higher wages or fringe benefits, but threats of unionism never occurred in the majority of others. When production workers became bored by routine work in later sessions, some initiated changes in their department, division, or organization, and others psychologically dropped out or openly subverted organizational rules. However, despite some differences all the organizations appeared to experience similar developmental stages.

In early sessions, participants universally displayed high commitment and investment in the organization and in their jobs. Work continued nonstop even between sessions, most participants displayed high energy levels, and entrepreneurs gained influence over organizational direction. As the organizations developed, coordination activities such as regularly scheduled meetings and formal liaisons became routine, participants began buying time off with their organizational dollars, work completely stopped between sessions, and systems for increasing efficiency of production (e.g., specialization of tasks and formalization of procedures for solving puzzles) were emphasized. Overall, the organizations moved from highly entrepreneurial and cohesive collections of departments that had little formal leadership in the first sessions, to well-integrated, formalized bureaucracies by the end of the simulation. The general development of the organizations closely followed the patterns predicted by the life-cycle models.

Perceptions of Organizational Effectiveness

Reported below are the changes that occurred in the perceptions of participants as the organizations moved from the creativity and entrepreneurship stage to the formalization and control stage. Changes in the ratings of the effectiveness criteria are presented first with respect to level of analysis, then with respect to domain of activity, and finally with respect to constituencies.

Levels of Analysis. Figure 1 shows the participants' ratings of the importance of effectiveness at different levels of analysis.[8] Individual effectiveness was rated relatively high in the early stages of development when individual task assignments and operating procedures were being determined, but it declined in importance as the organization moved toward formalization. In late stages of life-cycle development, effectiveness was least important at the individual level. Organizational effectiveness was initially rated as rather unimportant, but its rating steadily increased throughout the organization's development. In formalized organizations, the organization level was rated as the most important level of analysis for effectiveness. Departmental and divisional effectiveness were consistently rated as

[8] Using ANOVA tests indicated no significant differences among the 18 organizations on any of the ratings. All organizations are therefore discussed in the aggregate. See Gaito (1960) for a justification for using ANOVA with this type of data.

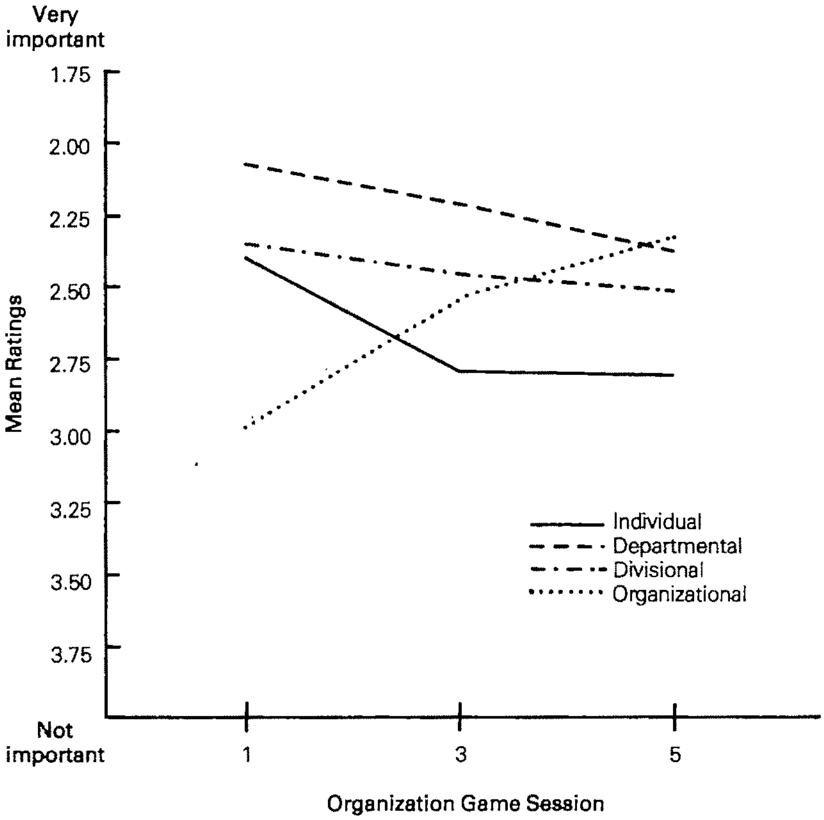


Figure 1. Ratings of effectiveness at different levels of analysis over developmental stages.

highly important, but ratings of both of these levels of analysis declined slightly as the organization matured.

High negative correlations existed between the ratings of the importance of organizational effectiveness and the ratings of individual, departmental, and divisional effectiveness (average correlation $r = -.97$). Correlations between individual, departmental, and divisional effectiveness, however, were consistently positive ($r = .89$).

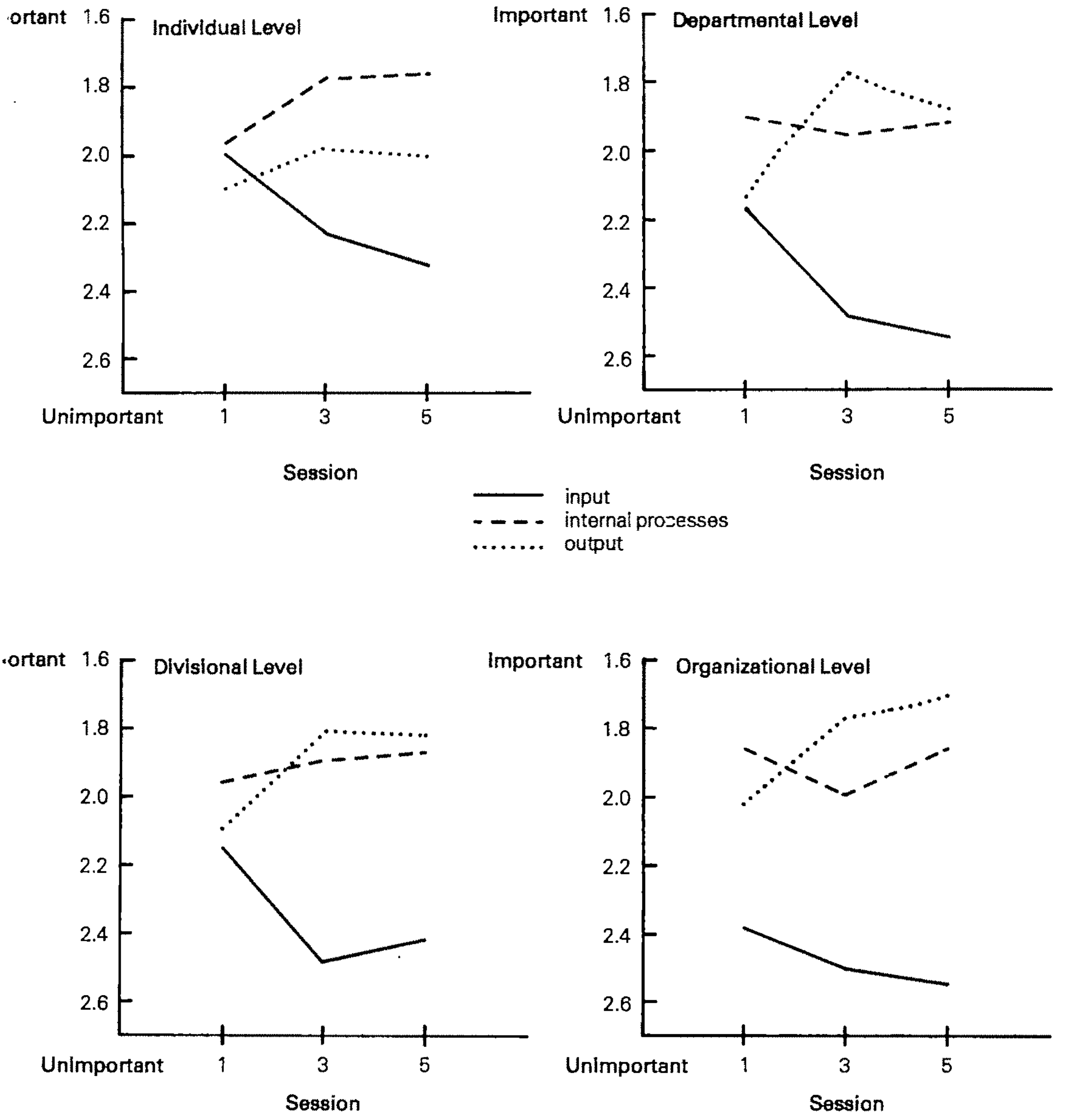
The analysis of variance, summarized in Table 1, provides an overall assessment of the effects of life-cycle development on the ratings of effectiveness at each level of analysis. Significant variation existed in the ratings of the individual, departmental, and organizational levels, depending on the organization's stage of development. Ratings of divisional effectiveness were not affected by stage of development. As noted above, however, ratings of the importance of individual and departmental effectiveness decreased as organizations developed, while the importance of organizational effectiveness increased.

Table 1

Analyses of Variance in Ratings of the Importance of Effectiveness at Different Levels of Analysis

Levels of Analysis	df	F	Significance	R^2
Individual	3	10.039	.000	.022
Departmental	3	6.287	.000	.014
Divisional	3	1.000	ns	.002
Organizational	3	14.548	.000	.032

Domains of Activity. Figure 2 shows the ratings of the importance of input, internal processes, and output of effectiveness for the four levels of analysis. Ratings of the importance of effectiveness in producing outputs were about equal at all levels of analysis in early life-cycle development, except at the organizational level. Output effectiveness increased in importance as the organizations developed, and input effectiveness declined in importance. There was a consistent emphasis on internal processes from creation to formalization.



re 2. Ratings of the importance of input, internal processes, and output effectiveness at different levels of analysis.

Results of analysis of variance (Table 2) support the notion that perceptions of the importance of different domains of activity are significantly changed during an organization's life cycle. When all levels of analysis were combined, perceptions of input effectiveness and output effectiveness were significantly affected by organizational life cycles ($p < .01$), whereas perceptions of internal processes effectiveness was not. Separate

Table 2

Analyses of Variance in Ratings of the Importance of Effectiveness in Different Domains of Activity

Domains of Activity	df	*F*	Significance	R^2
Input	3	4.988	.002	.011
Internal Processes	3	1.832	ns	.004
Output	3	4.670	.003	.010

analyses of each domain of activity at each level of analysis are consistent with this finding, but to conserve space, they are not reported here.

Constituencies. To ascertain the extent to which these results depended on differences in perceptions among individuals who held different positions in the simulation, we performed analyses of variance and covariance. Table 3 summarizes analyses of covariance that tested the extent to which the differences found in perceptions over time were moderated by the positions of participants in the organizations.[9] It was found that the organization's stage of development significantly affected the perceptions of importance of effectiveness of both input and output activities, regardless of the participant's position in the simulated organization. In contrast, the importance of effectiveness in the internal processes domain was not af-

Table 3

Differences in Ratings of the Importance of Effectiveness in Different Domains and Levels of Analysis When Controlling for the Organizational Position Held By Participants*

Analysis of Effectiveness	df	*F*	Significance	R^2
Input				
Position	1	1.323	ns	
Developmental stage	3	4.989	.002	.012
Internal processes				
Position	1	4.418	.04	
Developmental stage	3	1.972	ns	.008
Output				
Position	1	.844	ns	
Developmental stage	3	4.530	.004	.011
Individual level				
Position	1	1.802	ns	
Developmental stage	3	7.477	.000	.018
Departmental level				
Position	1	2.678	ns	
Developmental stage	3	.246	ns	.003
Divisional level				
Position	1	1.911	ns	
Developmental stage	3	.499	ns	.003
Organizational level				
Position	1	3.988	ns	
Developmental stage	3	.870	ns	.005

*In each analysis, "position" was treated as the covariate and "developmental stage" was the main effect.

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[9] ANOVAs were also run to test the interaction between the participant's position and the organization's stage of development. No significant interaction effects occur for any activity domain or level of analysis.

fected by the stage of development, but it was significantly affected by position. When treating position in the organization as a covariate, there were no significant effects of position in any of the four levels of analysis. On the other hand, the effect of developmental stage was significant only at the individual level of analysis when position was controlled. On the more aggregated levels of analysis, therefore, position in the organization seemed to moderate perceptions of effectiveness.

To clarify the relationships between the positions held by the participants and the ratings of effectiveness, we compared responses from those playing managers' roles (those responsible for hiring others, for setting departmental goals and direction, and for monitoring and controlling resources) with responses from non-managers, and we compared responses from production workers (those solving puzzles and anagrams) with responses from staff workers (those in support-service departments). An *F*-test comparing managers' ratings of the importance of organizational effectiveness with non-managers' ratings showed that managers rated organizational effectiveness significantly higher in importance after the third session of play ($p < .01$) than did non-managers. Similarly, staff members rated organizational effectiveness significantly higher in importance after the second session of play than did production workers ($p < .01$). The position held in the organization did not affect the ratings of individual, departmental, or divisional effectiveness.

Ratings of the importance of effectiveness in different domains of activity also varied across constituencies. When the four levels of analysis were combined, significant differences emerged between managers' and non-managers' ratings of the importance of internal processes effectiveness ($p < .001$), and between ratings by staff workers and by production workers ($p < .001$). In the final two sessions of the simulation, internal processes effectiveness was of highest concern to those playing managerial roles, but it was lowest in importance to individuals with non-managerial roles. Output effectiveness became by far the most important domain of activity for non-managers as the organization became formalized.

Significant differences also existed between ratings by participants in production departments and staff departments. Individuals in staff departments consistently rated internal processes effectiveness as more important than did individuals in production departments. Production workers rated output effectiveness as significantly more important than process effectiveness. In brief, managers and staff personnel were concerned mostly with internal processes effectiveness, which suggests that they were most interested in smooth coordination and intraorganizational relations. Non-managers and production workers placed more importance on output effectiveness, which suggests that their concern was with task accomplishment.

DISCUSSION

These results suggest that the simulated organizations developed through stages similar to those experienced by real organizations. That is, their major characteristics changed predictably over time. In the first stage of entrepreneurship and creativity, emphasis was on resource acquisition (input domain) and on a prime mover (individual level of analysis). In the later formalization and control stage, emphasis was on efficient production (output domain) and formalized, bureaucratic procedures (organizational level). Those with primary responsibility for the organization's welfare and survival (those in managerial positions) were more likely to reflect this shifting emphasis in their ratings than were other organizational members. Ratings of the importance of effectiveness in the domain of internal processes remained constantly high throughout all stages of development, but effectiveness was most important to those participants responsible for the coordination of internal processes (i.e., managers).

Explanations

One explanation for the shifting perceptions of organizational members during stages of development is that, during early stages of development in the simulation, individuals experienced uncertainty that resulted from a lack of organizational communication, from a scarcity of resources, and from unfamiliarity with a new set of task requirements. Therefore, they focused on acquiring resources on an individual basis (i.e., personal survival in the game), on accomplishing tasks, and on reducing personal uncertainty. As they became more aware of the immediate environment and of cause and effect relationships, and as task performance became more routine, participants sought broader challenges from domains other than that of resource acquisition.

This explanation is consistent with the strongly negative correlations between perceptions of uncertainty, complexity, and turbulence in the immediate environment and perceptions of the importance of the different levels of effectiveness. Strong negative relationships exist between the ratings of the importance of organizational effectiveness and the ratings of uncertainty ($r = -.73$), complexity ($r = -.88$), and turbulence ($r = -.50$). Moderately to strongly positive relationships exist between these three variables and the importance of individual, departmental, and divisional effectiveness ($\bar{r} = .55$). The positive relationship between uncertainty, complexity, and turbulence, on the one hand, and the three lower levels of analysis on the other, suggests that when individuals perceive their immediate environment as uncertain, complex, or turbulent, they emphasize achieving effectiveness on less aggregated levels of the organization.

An examination of these results from the social information perspective produces a second explanation of the changing perceptions over time. By focusing participants' attention on different elements in their immediate environment, certain items of feedback created implicit weights for the various criteria of effectiveness. During early stages of development, most participants received little feedback regarding the organization's overall performance. More often than not, those playing managerial roles kept the information they received about the organization's performance to themselves. What was evident to all participants in early stages, therefore, was the degree of success in obtaining personal resources. The extent to which this is so is reflected in the ratings of the importance participants attached to individual effectiveness and to the input domain.

As the organization developed, more and more information became available to managers and staff workers on the performance of departments, divisions, and the organization. Production workers, on the other hand, were likely to be immersed in production and task accomplishment and therefore were not likely to receive organizational information. This difference helps explain why managers and staff workers attached more importance to more aggregated levels of analysis than did production workers.

These results and the proposed explanations should be thought of as hypotheses that need to be tested in real organizations, not as conclusions about the nature of organizational effectiveness. That is, these relationships should be treated as questions needing further investigation in real organizational settings. However, it is still important to consider the validity of the simulation.

Validity

Various authors have pointed out at least four ways to judge the validity of an organizational simulation.

1. Do data from the simulated organization compare favorably to data from real organizations (Smith, 1972; Zaltman, 1972)? It is not possible to assess the validity of this simulation by comparing the specific results with data from real organizations because comparable "real" data are not available. However, the key social processes that were observed in the simulation, and which we have posited as explanations for the results, have been documented in real organizations. For example, the tendency of individuals to focus primarily on their individual performance under conditions of high uncertainty has been noted in the research literature (Kahn et al., 1964; Van Maanen, 1975; Katz, 1978, 1979). Also, the fact observed in this study that managers generally possessed more information than workers about overall organizational performance also was observed in several studies of organizations (Mintzberg, 1973; O'Reilly and Roberts, 1974).

2. Can face validity be established in terms of the degree to which participants find the game realistic, the degree to which they identify with their roles, and the degree to which they perceive required behaviors to be reasonable (Boocock, 1968)? Some evidence for face validity comes from the participants themselves, who were asked if the game was a worthwhile experience for learning about real organizational processes. Over 80 percent answered in the affirmative. In most cases the artificial nature of the game did not deter individuals from immersing themselves in their roles and interactions. Less than five percent reported in their written reports that the experience seemed inauthentic.

3. Are there foreign elements in the simulation? That is, are there elements in the game that are present only in the simulated setting and not in a real organizational setting (Breznitz and Leblich, 1970)? An assessment of this type of validity must be made by those who can meaningfully compare the simulated organization to real organizational processes. For this purpose, we obtained an unedited evaluation by executives and

administrators of the (former) Department of Health, Education, and Welfare who participated in a simulation conducted by Miles and Randolph as part of a management institute in 1978.[10] The large majority of the anonymous evaluations favored "realistic" validity (the simulation approximated real organizational situations). Two comments give a flavor of the responses: "This session made me really feel back home. The Organization Game integrated many of those exasperating situations that can be encountered." "I believe that this served to help me to gain insight in what to do about problems in our own organization, and why some things went sour that shouldn't."

4. Do the results of research using simulated organizations fit into a nomological network built from research on real organizations (Runkel and McGrath, 1972)? Some evidence of fit into a nomological network is provided by the consistency of this study's findings with the expectations derived from the organizational life-cycle models. Developmental stages in the simulated organizations seemed to parallel predictions of development derived from real organizations. However, since this is an exploratory study and the first of its kind to investigate changes in organizational effectiveness over time, it is premature to claim compelling evidence for theoretical validity.

Although we have presented arguments for the validity of these results, we must in the final analysis be cautious about the applicability of this study's results to real organizations. Because the time from creation to termination of the organizations in the simulations was only approximately eight hours, the stages that we observed may not be generalizable to organizations in which stages last for months or years. Similarly, the structure of "The Organization Game" may have produced artifacts in development that are not typical of non-simulated organizations. There is really no sure way to determine whether our findings are applicable to real organizations until similar studies are done over time in real organizations. However, it is important to keep in mind that the purpose of this study was to critique the prevailing approaches to measuring organizational effectiveness, rather than to make prescriptions for managerial practice. Because this is the objective, the issue of external validity is somewhat less critical.

IMPLICATIONS

There is one overarching implication of these findings for researchers of organizational effectiveness. *Different models of effectiveness and different levels of analysis, which currently are used interchangeably in research on organizational effectiveness may not be comparable, and their appropriateness may change predictably.* The findings of this study suggest that the interpretations of organizational effectiveness made by organizational members change in systematic ways across organizational life cycle stages. As organizations progress through early life-cycle stages, different elements become more or less emphasized, and the information available to participants changes in its nature and scope.

This study implies that the appropriate level of analysis for measuring organizational effectiveness may depend on organizational characteristics such as the level of uncertainty and environmental turbulence, on the constituency being considered, or on the stage of the life cycle. Because the appropriateness of a particular level of analysis may vary as a function of these characteristics, the level of analysis should not be selected on the basis of convenience or researcher preference.

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[10] The evaluation report was obtained from Miles by the first author.

The same argument applies to the debates over which model of effectiveness is most appropriate, since the major models of effectiveness focus on different domains of activity. The results of this study indicate that the appropriateness of any particular model of organizational effectiveness may depend on the environment, the constituency under investigation, and the life-cycle stage. The system-resource model appears to be the most appropriate model when uncertainty, complexity, and turbulence are high, or when formalization is low. The goal model, on the other hand, appears to be most appropriate to mature, formalized organizations in which activities are shaped by an emphasis on outputs.

This implication is consistent with Stasser and Deniston's (1979:345) conclusion from their comparison of the goal model with the system-resource model in health organizations. They state that "These data support a hypothesis that System effectiveness is in fact a necessary pre-condition for Goal effectiveness." In our study, effectiveness in the first stages of organizational life cycles (best typified by the system-resource approach) does appear to be a prerequisite for effectiveness in later stages (best typified by the goal approach).

Molnar and Rogers (1976), after finding that the system-resource model and the goal model measure separate but related aspects of effectiveness, proposed that the two models may not be equally appropriate in all settings and all types of organizations. Our study suggests that the two models may differ in appropriateness depending on the developmental stage of the organizations being investigated.

The effectiveness of internal processes and coordination was consistently very important to the participants in the simulation regardless of the organization's stage of development. In general, less variation occurred over developmental stages in ratings of the importance of internal processes effectiveness than in ratings of either input effectiveness or output effectiveness. By implication, the internal processes models of effectiveness (Argyris, 1964; Bennis, 1966; Likert, 1967; Nadler and Tushman, 1980) seem to be consistently appropriate, regardless of the organization's developmental stage.

In conclusion, we propose that a conscious selection of levels of analysis and of models of organizational effectiveness should be made in organizational research. These choices should be keyed specifically to organizational life cycles, constituencies, and environmental conditions. Life-cycle development in organizations has largely been ignored up to now in empirical investigations. This study suggests that our understanding of organizational behavior will be enhanced if more consideration is given to this important phenomenon.

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Organization and Control

Stewart Clegg

Organizations are complex structures-in-motion that are best conceptualized as historically constituted entities. The analytic focus of their constitution is the control of the labor process. This control is conceptualized in terms of different "rules" operative at different levels of the class structure in organizations. These rules are historically structured principles of organization. They may be related in a causal argument to the "long waves" of economic life. These arguments are not common in organization theory, and this paper draws upon an extensive literature from related research areas. The paper concludes by sketching some of the empirical research possibilities of this new perspective in organization analysis.•

INTRODUCTION

Control is not a new concept to students of organizations. As early as 1920, Carter Goodrich (1975) analyzed the struggle between management and workers over the "frontier of control." Management of this period, in attempting to win the frontier, employed the work of F.W. Taylor (1947). Subsequently, Taylor's work was elaborated into one of the mainstreams of organization theory. Different writers came to agree (i.e., Hickson, 1966) on the theoretical centrality of the degree of specificity of role prescription attached to various positions in the organization. This degree of specificity, which indicates the variability of autonomy, discretion, and freedom from direction, was implicitly a concept of control. More recently, the concept of control has reemerged in sharper perspective in a literature that has significant implications for organization theory, although it is not usually considered to be part of the theoretical mainstream.

This paper argues that this literature is relevant to organization theory. The literature stresses the control of the labor process by variables that have historical structure — that is, variables that change both temporally and spatially. In organization analysis it seems more appropriate to study the whole organization rather than to study individual role prescriptions. Studying the organization as a whole entails a far more elaborate concept than role prescription. Although organizations are composed of people, persons are not particularly important for analysis; it is their organization in a specific labor process that is important. This labor process includes not only the purposeful activity of work itself but also the instruments of labor and the objects that are worked upon. These may be as real as bricks and mortar, trowel and concrete, or as abstract as lofty thoughts of conceptual design. The lowliest laborer and the most ambitious architect are related by their involvement in a common labor process (Marx, 1976: 284).

Control in organizations is achieved through what may be termed "rules." These rules are not necessarily formally defined by members of the organization, although they may be. They do not depend on the members' cognizance of them for their analytic utility. "Rules" is meant merely as a term by which one can formulate the structure underlying the apparent surface of organizational life, rather as rules of grammar are formulated in structural linguistics (Chomsky, 1968). Unlike in structural linguistics, the concept of rules to be developed here

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is historical: the organization is a historically produced object. Rules are the fundamental organizing principles underlying decisive breaks of or interventions into control of the labor process. Each rule represents a distinct and historically evolved principle of organization that is embedded in the actual functioning of the organization.

Not all organizations have the same type of control in different times and places; so a key sociological question must be: what are the conditions of existence of these types of control? That is, how are different types of organization possible?

How one answers this question defines both the type of organization theorist one is and the theoretical "organization" one constructs for analysis. Typical answers refer to determination of organizations by "environments" (Aldrich, 1979) or by voluntaristic constructions of individuals (Weick, 1969; Silverman, 1970).

In the theory advanced here, organization is the result of economic agents calculating, miscalculating, and constructing the historical accumulation of capital. Organization structures are thus not necessarily determined by any thing, nor are they freely constructed.

CONTROL

Previous Statements

The recent restatements of the importance of the concept of control have been scattered in the literature in areas related to organization theory, such as the labor process (Braverman, 1974; Stark, 1980), the political economy of U.S. capitalism (Aglietta, 1979), the role of the new technical petty bourgeoisie (Gorz, 1972; Poulantzas, 1974), and the class struggle in the United States (Edwards, 1979). There have been three recent restatements in organization theory (Clegg, 1979; Salaman, 1979; Clegg and Dunkerley, 1980). Almost all of these draw on Marx (1976) and Braverman (1974).

Marx termed the process whereby capital develops its control over labor a development from "formal" to "real" subordination. In the earliest stage of the capitalist mode of production, in which labor produces surplus value through traditional methods and skills, the capitalists' major problem is how to appropriate as much of labor's value as possible. In the absence of technologies that enhance the productivity of labor, the limits to the accumulation of surplus value are the *absolute* limits of the working day (hence the chapters of *Capital* that concerned the struggle over the length of the working day). Without new technologies, additional surplus value can be accumulated only by extending the working day or by intensifying its drudgery. In this early stage, when the methods of production still belong to the workers but the means have been appropriated, capital's control over the labor process is still "formal."

"Real subordination" comes with the development of specifically capitalist processes of production that erode and diminish labor's ownership and control of the methods of production. The development of real subordination enlarges the possibilities of surplus-value accumulation. The possibilities are no longer bounded absolutely by the length and intensity of the working day they are enlarged enormously through the extraction of *relative* surplus value. In its modern form, this relative exploitation of labor is based on intensifying labor and increasing its productivity. These are achieved not only through technology, but also by the development both of a complex organization of specialized laborers and of an organizational apparatus to support the objective domination of the machine.

Control and Power

Our understanding of this organizational apparatus was significantly improved by Claus Offe (1976). Offe argued that Max Weber's (1958) model of bureaucracy depicts what Offe terms a task-continuous status organization, in which both functional and hierarchical differentiation coincide.[1] Historically, as a result of the increasing application of technique to technology, labor has become increasingly specialized. A consequence of this increasing specialization is the development of a "task-discontinuous status organization," which parallels the rational-legal hierarchy of office; both are examples of "functional differentiation." Offe noted that "hierarchical differentiation and functional differentiation both produce status systems [which] in the course of industrial development can become independent of one another" (Offe, 1976: 24).

In the task-continuous status organization, a relationship among different positions in the hierarchy exists "such that there is a wide area of technical rules to which equal obedience is required from all the occupants of the positions in the structure" (Offe, 1976: 25). A superordinate position dominates a subordinate position "in terms of greater mastery of the rules and greater ability, knowledge and experience in production" (Offe, 1976 25). The rules that a subordinate must obey become, in their entirety, components of the role definition of a superordinate. Offe's example of this organizational structure is "the production organization of the small craft workshop, with its triple hierarchical division of master, journeyman and apprentice" (Offe, 1976: 25). In such a structure, power clearly is derived from ownership and control of the means of production, and, overlying this, from knowledge of the methods of production. Offe's example is not typical of the modern large-scale organization and presents no particular problems for analysis. In this example, power is derived from ownership and control of the key resources of production: means and method.

The separation that developed historically between the ownership and control of the means of production and the ownership and control of the methods of production can generate opposing and contradictory interests and strategies. Control of methods on an individualistic rather than a collective basis gives rise to the problem of "power," defined in organization theory as "illegitimate" and "informal" bases of control derived from knowledge of methods of production (skills) that are non-routinized, unsubstitutable, and central to the organization. (See Hickson et al., 1971; Hinings et al., 1974; Clegg, 1975, 1977, 1979. This literature is well known; the most cited example is Crozier's [1964] maintenance men.) When an organization acts to reassert control over the "informal," "illegitimate" bases, changes may be seen in the social relations within the organization's occupation structure.

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[1] One must assume an equal probability of open access to all levels of the bureaucracy on the basis of competitive examination. Of course, once one introduces the variables of class, racial, ethnic, and sexual structure of the population, the structure becomes more discontinuous.

Power is exercised through these individualistic bases. More importantly, however, power is exercised in class struggle, where trade unions and employers' associations have attempted to represent, respectively, the control of methods and the control of means of production on a collective basis. The practice of power in such a struggle results in practices of, for example, cooptation, incorporation, de-skilling and hyperqualification, technological substitution, or buying out.

The structurally generated effects of the practice of power in class struggle may be more systematically identified. Carchedi's (1977) work on the economic identification of social classes enables us to construct a typology that encompasses much of the literature. This typology (Table) arranges the structurally generated situations in which power conflicts have a collective basis rather than an individualistic one. The typology is generated by cross-classification (see Baldamus, 1979).

Table

Schematic Representation of Class-Structured Power Conflicts in Organizations

	Working Class	New Middle Class	Ruling Class
Working Class	Demarcation disputes; closed shop exclusions; local, regional, and international division of labor.	Men in the middle engaged in disputes about bonus, productivity, speeds, for example.	Disputes about liquidation; bankruptcy; capital strikes and starvation; lock-outs; "rationalization" through productivity and restrictive practices deals.
New Middle Class		Line vs. staff conflicts; cosmopolitans vs. locals; bureaucrats vs. professionals.	Disputes about the cheapening of non-surplus value producing labor process, through automation; standardization, via, for example, Electronic Data Processing (EDP) and other microprocess-related technology.
Ruling Class			Disputes about takeovers, mergers, trustification.

Note: The criteria for identification are the relations of agents to the production of value and to its appropriation (see Figure).

This typology elucidates the structurally generated conflicts within organizations. These conflicts operate through the nonneutrality of job design, technology, and organization structure as ideological practices. These have real effects on the experience of control as a more or less legitimate structure of goals, means, and distribution of resources (Fox, 1974).

This typology lacks process and action. Conflicts and uses of power are organized around something that people find worth struggling to control: the labor process, the site of most of our mature lives, the source of our wages and profits.

If we wish to add process and action, we have to recall that the transition from formal to real subordination is not conceptualized as unproblematic. The transition is conditioned, if not determined, by the class struggle, the state of the labor markets (particularly vis-à-vis the reserve army of the unemployed), the tendency toward the rising organic composition of capital, and the capacity of the markets to absorb additional production and, thus, for the value to be realized.

LIMITATIONS OF THE LABOR-PROCESS PERSPECTIVE

Braverman's (1974) analysis of the development of the labor process has been criticized both for neglecting the variables — particularly class struggle — that condition the transition from formal to real subordination, and for positing a one-dimensional and unidirectional thesis of "de-skilling" (e.g., Palmer, 1975; Friedman, 1977; Jacoby, 1976; Aronowitz, 1978; Coombs, 1978; Edwards, 1978; Stark, 1980). In particular, Braverman was criticized for his "romance" of labor (Cutler, 1978). Stark (1980: 89) recently suggested that Braverman's work, although a "powerful moral document," has major limitations inasmuch as it failed to focus "on relations of conflict and alliance between and within the historically determined organizations which are constitutive of class formation across the various levels of social structure." Because of this lack of focus, Braverman condensed, simplified and truncated what was in fact an uneven process of the development of Taylorism (Maier, 1970; Palmer, 1975; Littler, 1978; Stark, 1980). Bravermen also understated the "perennial resistance to rationalization and the real limitations to any managerial strategy for complete control of the labor process" (Stark, 1980: 92–93) that workers were able to generate.

Although de-skilling has undoubtedly taken place, it has frequently occurred in the context of what Gramsci (1971) called "Fordism." Fordism involves assembly-line production, and it increases the workers' interdependence and thus their ability to disrupt production through "individual acts of sabotage, collective activity, or the more passive forms of simply not showing up for work" (Stark, 1980: 93). This interdependence gives workers a far more active role than Braverman allowed. Additionally, there is the need to reconsider Braverman's picture of the ruling class; he viewed the ruling class as having almost Lucaksian subjectivity that is represented as an unproblematic and unified "capital-logic" (Aronowitz, 1978). The Brighton Labor Process Group (1977) also noted the tendency toward de-skilling in the move from formal to real subordination but, unlike Braverman, located it within the organizational totality. According to this view, de-skilling is not as pervasive or unitary as Braverman suggested. Labor, materials, and instruments in production can always be combined in more than one way, and so capital attempts to control the combination. But of course, since control can never be total, not all roles can be exactly and absolutely prescribed. Independent skilled work, in particular, may remain a functional necessity, even when the organization is formally totally hierarchical. Not every aspect of the labor process will be de-skilled, nor can it be.

De-skilling is only a part of the overall process of change. Because some work roles are de-qualified, others are simultaneously "hyper-qualified". These are managerial, discretionary work elements. Minimization of trust in one sphere may well entail its maximization in another (Fox, 1974). These differentials are not only intraorganizational. They become interorganizational and regionally specific in the world-wide division of labor.

ORGANIZATION AS A STRUCTURE-IN-PROCESS: STATEMENTS

Recently, a number of writers have conceived of the organization of the labor process as a totality that is a *structure-in-process.* In this conception, structure evolves; the focus is on social dynamics rather than on social statics. This conception of organization clears the way for a delimitation of the types of control that are linked to stages in the development of capital accumulation, the motive force for which can be explained as the articulations of contradictions generated by each stage of development.

The idea that there are types of control that do not necessarily correspond to a unidirectional evolution of de-skilling was offered by Edwards (1978). He began in the now-familiar manner, criticizing Braverman while acknowledging his brilliance. Notably, Edwards' (1978: 110) major criticism was that "Braverman has left class conflict out of his analysis of the labor process" (a point developed skillfully by Aronowitz (1978) in the same issue of *The Insurgent Sociologist).* Edwards' analysis put class conflict back in the labor process by focusing on the development of discrete systems of control. According to Edwards (1978: 112), control of the labor process has three elements: (1) directing work tasks; (2) evaluating the work done; and (3) rewarding and disciplining workers.

Edwards (1978) identified three "historically important and essentially quite different ways of organizing these three elements." The first, "simple control," is direct, open, and interpersonal; it seems to correspond more or less to Simon's (1952) notion of direct, extensive, formal control (see Offe, 1976; Clegg, 1979: 118). In the second, "technical control," "the control mechanism is embedded in the physical technology of the firm." In the third, "bureaucratic control," "control becomes embedded in the social organization of the enterprise, in the contrived social relations of production at the point of production." The key feature of this social organization is the widespread acceptance and use of Weber's (1968) formally rational ideal type of legal-rational bureaucracy. The second and third are "structural" ways of organizing control.

In Edwards' argument, the transition from simple control to technical control developed from the employer's efforts to control conflict in the areas of production; the transition from simple control to bureaucratic control developed from similar efforts to control conflict in administration. Such simple differentiations are no longer possible because of "the incompleteness of technical control and the increasingly factory character of administrative work" (Edwards, 1978). Furthermore, not only the employers, but also the unions now staff and manage the contemporary forms of bureaucratic control (see Edwards, 1979).

A developmental logic is clear in Edwards' analysis. An example is his observation that developments within the firm reflected and interacted with a broader reorganization: the development of monopoly capitalism, itself a response to the driving force of capital accumulation. Indeed, he argued that "each form of control corresponds to a definite stage in the development of the "representative" or most important firms, and so the systems of control correspond to or characterize stages of capitalism" (Edwards, 1978: 112). The development of these systems of control has been uneven across different sectors of the economy.

Edwards' (1978) analysis, while insightful, contained some lacunae. Its most significant lacuna was its lack of an adequate theorization of the organization *as a complex unity* of distinct types of control; it simply identified the three types in a developmental logic. Furthermore, although Edwards offered a distinction between the monopoly and competitive sectors of a modern economy, the distinction was hardly adequate as a realistic sectoring, largely because a consideration of the role of the state was absent.

The major advance in Aglietta's (1979) work was its attempt to integrate the type of concrete history that Edwards attempted with a more rigorous analysis of the laws of motion of the capitalist-accumulation process that underlie the changes in control. This led to the idea that the labor process is a complex unity that is a "structure-in-motion." Aglietta's (1979) key concepts were that changes in the regulation of structural forms are conditioned by crises. Davis (1978: 212) described crises as "creative ruptures" in the continuity of the reproduction of social relations which lead to their restructuring in new forms. Structural forms, such as organizations, are complex social relations that are historical products both of the class struggle and of changing cycles of capital accumulation. Recognizing this relationship, Davis proposed a periodic succession of intraorganizational regimes that were constructed to correspond with the averaged succession of Kondratieffian "long waves" (Davis, 1978: 259; see also Mandel 1975; Barr, 1979). Major changes in the organization of the labor process thus take on a historically rational evolution. They emerge as responses by dominant economic agents (i.e., dominant coalitions) within organizations to changed conditions of accumulation. In order to try to construct more profitable conditions, economic agents effect reorganization. New underlying principles of organization are tried, widely adopted, and accepted as the rules for particular aspects of particular labor processes. The genesis and adoption of these rules are not random, but are conditioned by fundamental movements. These movements are long waves.

CONTROL AND STRUCTURE: A THEORY GENERATION

A specific, realistic theory of contested control and class struggle requires a more complex notion of what organization entails. First, it requires a representation of a spatial structuring of relations of production that is not simply physical but is especially social. Organizations are the sites of the social relations of production that define class structure. Different types of organizations are constructed at different levels of the class structure, and different levels of the organization are constructed at different levels of the class structure. Consequently, different types of control tend to evolve in specific relationships to different levels of the class structure, and this occurs both intra- and interorganizationally. Within the organization, different control rules evolve at different times and at different stages of functional complexity. Earlier rules may persist at specific levels in the organization, despite the later development of more complex rules. These rules may be represented as a superimposed series. As is in the nature of social reality, the articulation of relations among the different levels may produce not only unanticipated consequences but also contradictions. The layers of rules exist in a dynamic relationship with each other. The metaphor most apt for representing this layering is drawn from geology: sedimentation.

Layers of sediment (or strata) provide a record of historically evolved structure. Classes are the strata of society. They may be represented in an ideal and abstract form through a series of categorical distinctions. These are depicted in the Figure. The definitions of the working class, the middle class, and the ruling class hinge on the relationship to the value of the different categories of agents. Simple descriptions of the typical range of occupations are also provided. In the Figure, the class categories run horizontally across the page. The concrete history of organizational strategic calculations, management techniques, and practices provides the temporal coordinates of the vertical axis. These correspond to the rules that represent ways of formulating decisive breaks or interventions in principles of organization. In their moment of dominance, the rules may be related to the development of long waves in the world economy. The rules become dominant at particular moments because they represent strategies appropriate to the conjunctural possibilities of accumulation. The locus of their decision making may be either within or outside the focal organization. The locus is less important than are the effects registered in the structure of social relations of production. These effects constitute the organization's structure through introducing the different rules of control. In this way, the task-discontinuity develops.

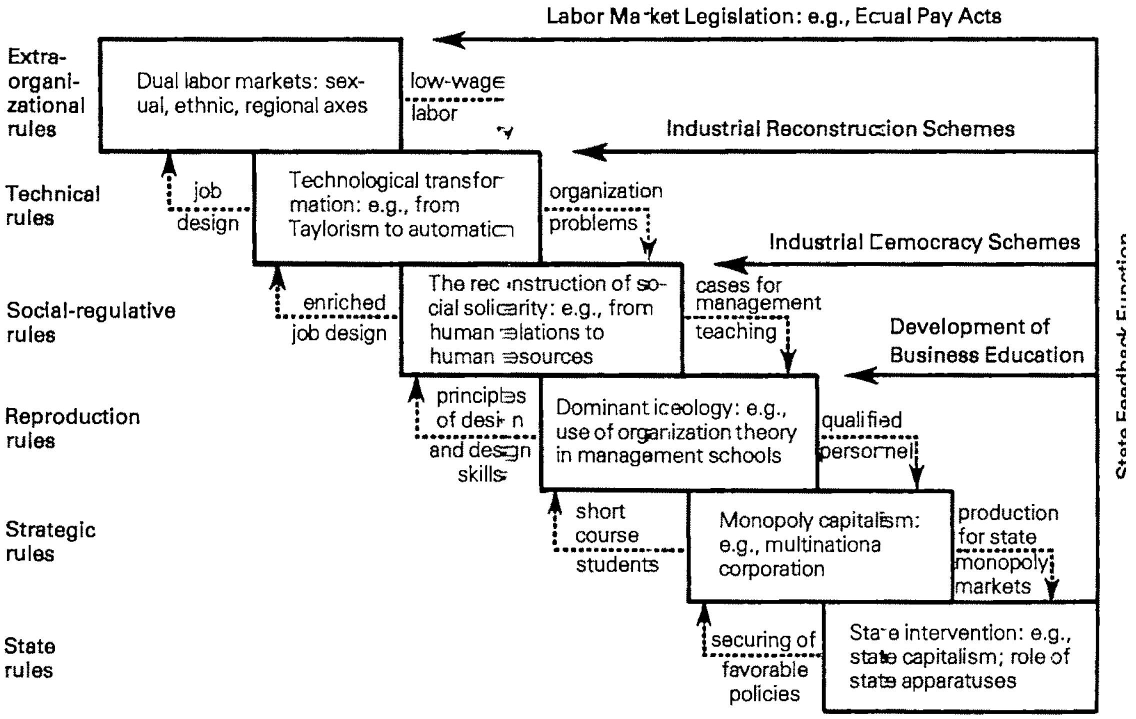
The Figure is a matrix; the diagonal, stepped series represents the level of the class structure at which the rules operate in their greatest specificity. Although historical in conception, they persist and endure at different levels of the organization. Developments in strategic calculations, management techniques, and practices transform the evolving task-discontinuous organization. Different interventions are specific to different levels of the class structure as it is produced, re-produced, and transformed in organization structures. These interventions have their dominant moments, but they may persist and endure as residues of earlier practices. I conceive of these rules as selecting what is enacted for the organization, so I call them *sedimented selection rules.*

The role of the state as the overall agency of organizational life that makes, defines, and enforces rules is not neglected. In the most recent postwar era of the post-Keynesian "managed" economy, the state has become dominant, particularly in the monopoly sector and, of course, in the state-capitalist sector (see Clegg and Dunkerley, 1980: Chapter 13). The effects of the state have a feedback function at all levels of organizational practice; specific state interventions have specific effects at specific levels.

Finally, since we are dealing with a sedimented structure, we need to look at the interrelationships between levels. These are represented in the diagram by the hatched lines that depict the interrelations between rules. For instance, dual labor markets generate low-wage labor that can be utilized through job design, which de-skills more complex elements of the labor process; such de-skilling, particularly in full-employment conditions, can generate such organization problems as absenteeism and turnover. These are remedied through enriched job design, the principles of which are taught as part of the dominant ideology of organization theory in business schools. Students of these schools are drawn primarily from the ranks of the state-capitalist and monopoly-capitalist sectors, and they learn through studying cases drawn from the literature of organization problems. Students who survive the corporate race to executive positions then become the nexus between the state (as regulator and as market) and monopoly capital.

Figure: The sedimented structure of selection rules.

	Working Class	Middle Class	Ruling Class
Relations to value	producers, exploited, non-owners, laborers, wage earners	non-producers, exploiters, non-owners, non-laborers, revenue-receivers	non-producers, exploiters, owners, non-laborers, revenue-receivers
Simple description	Occupational range unskilled — skilled	Occupational range supervisory — managerial professional	Ownership and control of the organization as a whole private — public


Labor Market Legislation: e.g., Equal Pay Acts
Extra-organizational rules
Dual labor markets: sexual, ethnic, regional axes
low-wage labor
Industrial Reconstruction Schemes
Technical rules
job design
Technological transformation: e.g., from Taylorism to automation
organization problems
Industrial Democracy Schemes
Social-regulative rules
enriched job design
The reconstruction of social solidarity: e.g., from human relations to human resources
cases for management teaching
Development of Business Education
Reproduction rules
principles of design and design skills
Dominant ideology: e.g., use of organization theory in management schools
qualified personnel
Strategic rules
short course students
Monopoly capitalism: e.g., multinational corporation
production for state monopoly markets
State rules
securing of favorable policies
State intervention: e.g., state capitalism; role of state apparatuses
State Feedback Function

Note: The figure is a diagonal matrix. The stepped series represent the intersection of types of rules and levels of class structure in the organization. Hatched lines represent the articulation between levels while the solid lines represent the effect of the state.

Sedimented Selection Rules and Long Waves

A whole era may be characterized as having had relatively fast or slow accumulation. Accumulation depends on the rate of profit. A heightened rate of profit leads to relatively fast accumulation. The relationship between periods of fast and slow accumulation is one of succeeding cycles of "long waves of accelerated and decelerated accumulation determined by long waves in the rise and decline of the rate of profit" (Mandel, 1975: 129). The expansionary, accelerating phase of a long wave occurs when the rate of profit is triggered by factors that lower the organic composition of capital or raise the rate of surplus value. As these factors are exhausted, the rate of profit begins to fall because of unfavorable changes in either the organic composition of capital or the rate of surplus value. The long wave moves back into expansion when the rate of profit is once again lifted radically by a further combination of factors. New technologies, particularly energy technology, play a leading role as triggers. However, as Rowthorn (1976: 64) stressed, the role of social technologies of control should not be neglected when considering these cycles. An example of social technologies is the general adoption of specific practices of organization. Certain speculative possibilities may be sketched for organization analysis.

We can distinguish the following long cycles of capitalist development that occurred in the past hundred years. The general depression that lasted from the early 1870s until the mid-1890s marked the downturn of a long wave; an upturn occurred from the mid-1890s to the first World War. The next downturn persisted through the 1920s to the beginning of the Second World War, which marked an accelerated renewal of accumulation that persisted until the late 1960s. Since then, we have clearly been in a downturn.

Each upturn in accumulation has seen the emergence of institutions that have intervened in, and thus framed, the organization of the labor process. The institutions have been major determinants of renewed accumulation, and they have been historically sedimented, as depicted in the Figure.

The upturn that began in the 1890s marked the emergence of attempts to apply formal abstract theories of organization to the labor process. One of these theories was F.W. Taylor's (1947) scientific management. The development of scientific management depended upon a number of interrelated radical innovations in technology. In particular, it was possible because of the development of electricity as an energy source capable of powering new production technologies such as high-speed lathes. Such innovations were the technological foundations for the erosion of craft and personal skill. This erosion, a tactical move in the class struggle, was facilitated by Taylor's system, initially in the steel industry and later more generally. We can refer to interventions of this type as technical rules, since they stress the rule of technique over the will of the worker.

Because of the increasingly routinized, simplified, and deskilled labor process (made possible by innovations such as Taylor's), during the First World War the capitalist labor process assimilated many raw recruits. Most notable among these were women,[2] young people, and aged peasants, who, through the real subordination of the labor process, were able to be rapidly inducted into these new forms of labor. In the postwar period, this Tayloist simplification of the labor process was extended from the shop floor to the office, where female labor became increasingly a cheap and unskilled source of commercial work.

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[2] This was true at least in the U.K. In the U.S., where migration was of considerable importance in easing labor shortages (and in limiting working-class collective power) this was to be less significant.

During the downturn of the inter-war period, the increase in de-skilling and routinizing white collar office work was a major device for increasing the efficiency of capital. This increase created a more homogenous labor process and a less skilled and less differentiated labor force that was recruited from increasingly differentiated labor markets. The major axes of differentiation, ethnicity and sex, were used to construct institutionalized skill and wage differences. We can refer to this form of labor market segmentation as an intervention constructed through the use of existing extraorganizational divisions. They may be termed *extraorganizational rules* (Clegg, 1979).

The individual enterprise or organization is not the overall economy. The economy of full employment during WW II and the long postwar boom posed particular problems for the organization and control of the labor process at the level of specific enterprises. Specifically, the war and postwar economies minimized the coercive domination of the reserve army of the unemployed, and so, as we might anticipate, the balance of domination became more hegemonic. In Mayo's (1975) studies, the breakdown of social solidarity and the subsequent articulation from human relations to human resources and work humanization during the long postwar boom may be identified as an intervention into the *social-regulative rules* of the organization, precisely because more coercive controls were unavailable due to the absence of the reserve army of the unemployed.

A major effect of full employment in the postwar period was the specialization of forms of labor control contingent upon the class structure of occupations. Friedman (1977) suggested that the two strategies which I have termed *technical rules* and *social-regulative rules* may have been applied to the labor process not only in different moments of the world's economic history (particularly since its rhythm has been modulated by two world wars), but also to different elements in the labor process. Technical rules tend to be applied to workers who are more peripheral to the labor process (less strategically contingent); social regulative rules tend to be applied to workers who are more central (more strategically contingent). This differential strategy arises as a way of handling inflexibilities that are generated by three contradictions within each intervention into the labor process.

First, Tayloist technical rules could not be applied universally. Not everyone could be de-skilled, nor could everyone be a high-wage laborer. In both spheres, differentials would have to be preserved for the strategy to work. Second, the affluent worker is not necessarily a happy worker. Third, the affluent worker is not necessarily a very satisfactory worker in situations demanding flexibility and some discretion. It is precisely the more strategically contingent workers that management will attempt to control through more subtle hegemonic domination, that is, through social-regulative rules.

This division of the work force can be carried further by *extraorganizational rules* (Clegg, 1979). The specialization of forms of labor control contingent upon the class structure of occupations can be extended through a sexual, racial, or ethnic division of labor that is extraorganizational in its dividing principle. Those skills that are not strategically contingent — generally those with low status, relatively low pay, and low job entrance requirements — can be further distinguished from the rest of the labor process, with the effect of minimizing the possibility of labor's developing a collective consciousness of itself *for* itself. In this way, the contradictory possibility that the concept participation might become a collective and liberating catchword would be minimized. Taylorizing unstrategic skills in the organization has promoted this distinction. Because of their low social status in the labor market, unstrategic skills tend to attract the most socially disadvantaged groups in the labor force. These are groups that are sexually and racially discriminated against: women and ethnic minorities, such as blacks or recent migrants. It has frequently been observed that management will often actively encourage this distinction by overqualifying managerial skills and other strategically contingent skills or by locating administration and research tasks only where white male, native-born workers can easily get to them. Friedman (1977) argued that there is substantial evidence "from several countries concerning the more volatile unemployment levels for blacks, immigrants and women." One can cite Edwards, Reich, and Weisskopf (1972) and Castles and Kosack (1973) as evidence. These extraorganizational rules relate, then, to the structure of the secondary labor force.

Social-regulative rules tend to be aimed at workers in the "new middle class" (Carchedi, 1977) who perform contradictory supervisory functions as collective workers *and* as global capitalists. If this thesis is correct, we would expect to find that controls on the working class will tend to be either technical rules or extraorganizational rules. Extraorganizational rules function through the development of secondary labor markets, largely at the level of relatively unskilled workers. Technical rules tend to be developed in relation to technological transformations such as Taylorism or automation, processes that increase the amount of surplus that can be obtained from skilled workers. It is this phenomenon of intervention by technical rules that can generate the limited discretionary powers of decision making (e.g., Crozier's [1964] maintenance workers). These discretionary powers are historically sedimented in residual craft skills that escaped rationalization by scientific management.

Any organization based on mass production has to harness its labor power to its machine power for the maximum utilizable time because of the peculiarities of modern plant economy. The more that a modern plant is utilized by the organization below its rated capacity, the greater will be the cost of the plant's output. Hence, economy of production is achieved and the greatest surplus is potentially produced when maximal production is achieved. However, the market must be able to absorb the increased output. In a market economy, "no intrinsic correlation exists between increased output and the capacity of effective demand to absorb production" (Sohn-Rethel, 1976: 31). The consequence is that, although technical and social-regulative rules may maintain productivity, they are not sufficient by themselves. Sometimes they are not even necessary. This analysis of the need for such strategies applies best to developed market economy social formations, in which the national proletariat, on the average, forms part of an international labor aristocracy. In low-wage, less developed social formations — the periphery and semi-periphery of the world economy — hegemony will recede in importance. For this reason, a large number (Vernon's 1973 estimate was 187) of U.S., European, and Japanese international firms are established in the more peripheral regions. The enterprises have been located there precisely because of the reduced cost of the labor process, the possibility of multi-factor supply for core production (as in the U.S.), and transfer pricing. The firms, as Karpik (1977) and Adam (1975) argued, tend to be large technological enterprises. That part of their control of the labor process that is not assured by their relatively high pay scales and by the large reserve army of the unemployed can frequently be assured by the policies of the domestic state. This assurance is the existence of a compliant workforce that asserts little or no power.

We can now consider the organizations that operate primarily in the core states of the world economy — in particular, those organizations generated by the upturn of the cycle of accumulation in the postwar era. This developed on the basis of an important bunching of inventions in production and energy use during the inter-war period. These inventions were associated in particular with the automobile industry (the postwar boom is often called "the age of the internal combustion engine"). Associated with this age was the impact on mass consumption of the development of large electronics and plastics industries. The leading firms in these industries are primarily monopoly capitalist organizations. The developing domination of technological capitalism and other forms of monopoly capitalism in the postwar boom necessitated a further intervention in organizations that we can call *strategic rules*. Strategic rules are an intervention in both production and circulation of commodities. (In contrast, social regulative rules and technical rules are interventions only in the production of commodities. As such, they are a one-sided intervention that necessitates the further intervention of strategic rules.)

Intraorganizational interventions into production have to be buttressed and supported by strategic rules: interventions into the market in order to exert rational control (Sohn-Rethel, 1978: 32; see also Baran and Sweezy, 1966). The significance of organizations' capacity to plan becomes apparent when we consider that during 1970–1971, multinational organizations controlled 20 percent of industrial output in the capitalist world and 30 percent of world trade. At the same time, they possessed three times the gold and currency reserves of the United States (Mandel, 1975: 23). It has been forecast that, by the end of this century, between two and three hundred multinationals will control 75 percent of the private assets of the capitalist world (Wheelwright, 1974).

Two aspects of corporate dominance hinge on problems of control. The first aspect is the control by the corporate organizations of the new, massively expanded middle class strata of supervisors, managers, and professionals within these organizations. The second aspect is the control of the large corporate organizations by the expanded strata of middle class professional workers within the state apparatuses. This aspect entails a rejection of the classical liberal conception of state/market relations in the face of corporate dominance.

The development of both state and private organizations gave rise to strata of non-producers/exploiters/non-owners/revenue-receivers who operate extensive controls over and in the organization. These agents do not necessarily have the decisive material interest of ownership (legal possession) of the means of production that they control. Then how are the means of production to be controlled? That is, in terms of the Figure, what are the *reproduction rules* of late capitalism and where are they located? It was argued elsewhere (Clegg and Dunkerley, 1980) that the business and management schools have become the institutional sites for the reproduction of the contemporary dominant ideology of late capitalism (see also Marceau, Thomas, and Whitley, 1978). This dominant ideology functions mainly to control the actions of the organizational agents who enjoy the most discretion or the least specificity of role prescription and who are not constrained simply by the practices of routinely designed work. As both Marcuse (1964) and Perrow (1972) argued, control is best achieved by employing agents that have rules and rationality built into them through educational socialization.

Finally, as was argued in considerably more detail elsewhere (Clegg, 1979; Clegg and Dunkerley, 1980), we have to consider the role of the state in the interventions into the labor process. The state cannot be conceived of as a polity parallel to and outside of the economy. Its resources are one of the major prizes to be fought over, bribed for, and won among corporate executives. The state, through defining, making, and enforcing rules, structures the space in which organizations operate. Large organizations, being powerful, attempt to arrange this structure to suit their own interests.

The state is a potential source of protection for capitalist organizations operating on the market (see McCullough and Shannon, 1977). Polanyi (1957) described two central features of the market system. First, greater profit accrues to organizations that possess larger amounts of resources. There is therefore continual pressure toward monopolization and toward the creation of privileged access to resources. Second, the market system is dynamic; it creates risks and uncertainties for any specific organization, since new areas of demands and new profit opportunities can be continually exploited. This dynamism often undercuts existing organization profit centers. Hence, in order to protect and to increase their advantages, organizations continually attempt to control the contingencies that are strategic for their profit-centered activity. Organization agents therefore attempt to use the state to affect the market in their interests (Wallerstein, 1974: 405) and to secure favorable state interventions in the socialization of costs, risks, and losses. Additionally, the state becomes the major consumer of much monopoly production, particularly of defense systems and of electronic data-processing equipment. This state/capital interdependence, particularly as mediated through taxes and inflation, may well generate profound "fiscal crises" (O'Connor, 1974) and "legitimation crises" (Habermas, 1976).

The state is also important as both a factor of cohesion and as a disarticulator of the totality, as depicted in the state's feedback functions in the Figure. These functions can have anticipated and unanticipated consequences. For example, the Crawford Report (Crawford et al., 1979), a federal government report on the manufacturing industry in Australia, argued that equal-pay legislation (extraorganizational level) has increased the rate of adoption of new technology (level of technical rules). This legislation has thus exacerbated industrial-relations conflicts and unemployment, both of which have profound effects at the state level. Exchange values involved in the labor process have increased because of equal-pay legislation, and so organizations have attempted to cheapen their labor process by substituting technologically advanced computerized intelligence systems.

Computerized intelligence systems may be similar to the bunched technological innovations that characterized the upturns of earlier long waves, but their effects are likely to be even more dramatic in their impact on the organization and control of the labor process. Earlier long waves, in their ascendant phase, created employment. However, the available but scanty evidence does not suggest that this is now the case (Hill, 1980). Microprocessors and allied technology have enormous potential for reducing production costs (by minimizing labor), but their effect on demand is potentially harsh. The de-laborization that is progressing in the advanced economies will not restore aggregate effective demand as long as income is distributed to individuals according to their economic activity. Restoring demand will require allocating income socially, on the basis of a massive redistribution of increasingly scarce employment opportunities. This redistribution would involve changing work hours, sharing jobs, and radically restructuring labor processes around principles different from those that underlie the "rules" discussed here. Decision making would have to shift from private interorganizational criteria to public, societal criteria. Such a transformation will hardly be achieved through existing forms, either organizational or state.

CONCLUSION

The concept of control has been developed in this paper in an ideal typical analysis of organization. The concept already suggests new relationships and patterns in organizational phenomena. Considerable unifying potential attaches to the concept, particularly in as much as both macro- and microphenomena can be developed together within the same framework. What type of research might be generated from this exercise in conceptual clarification and development?

The contention of this paper is that organizations have been constructed on the basis of differential modes of control of their overall labor process and that different modes of control become specialized at different levels of the class structure in organizations. Intensive control characterizes lower-class participants, internal control characterizes middle-class participants, and extensive control characterizes ruling-class participants.

This exercise has been highly abstract. As such, it offers a simple sketch of complexities that might be encountered at the level of concrete organization that are open to empirical scrutiny. To bridge the gap between organization as theoretical abstraction and the organization as concrete particular, resistant to abstraction, an intermediate level of analysis is required. This intermediate analysis concerns the uneven development of organizations' labor processes through three dimensions: time (with long waves as hypothetical structuring frames for breaks); space (the internal class structure of organizations; the location of the specific organizations in particular regions of the world economy with their peculiar histories); and economy (the dominant sector, e.g., monopoly capital, within the particular branch, e.g., coal mining). Space and economy are the dependent variables; the independent variable is time, measured by the modalities of historically specific long waves. If one holds constant the branch within an industry in which a particular sector of capital dominates, do organizations drawn from the dominant sector display the same patterns of evolution within a given internal class structure and across different regions of the world economy? Contingency theory, which emphasizes internal determination by size or external determination by environment, would suggest a positive answer. Contingency theory stresses different aspects of organization than those elaborated here (see, for example, Lammers and Hickson, 1979, particularly "Conclusions").

The research effort would be of two kinds. The first, consisting of documentary analysis of archival materials drawn from and focusing on a sample of organizations within a particular branch of industry, would construct an ideal typical model of the major breaks in organizational control rules. Here the work of Dan Clawson (1980) must be regarded as a landmark, particularly in its emphasis on how the choices of organizational designers are conditioned by the imperatives of class struggle (ruling-class accumulation of value and working-class resistance to increased control).

The second kind of research would be ongoing. We are clearly entering an age of uncertainty in organization structure. Technological developments such as the possibly bunched innovations in computerized intelligence systems seem poised to produce very different organizations that will certainly have unforeseen political effects. Over the next decade, research could investigate the range of organization design options in particular industries by canvassing unions, management, and the state. The findings could be most usefully compared with the range of decisions actually implemented at the organization level.

The first phase would represent a revision of organization analysis, particularly inasmuch as it might confirm the "sedimentation" of control empirically discovered by Burawoy (1979). Organization theory would then have to come to terms with a realization that reality has to be understood in terms of its ontogeny, as well as its size or environment. The second phase would represent a relocation of organization analysis, or at least aspects of it, within a framework that would be much more explicitly political than the present one is. We already have Marglin's (1974) historical example; Sampson's (1976) analysis of the structural development of the oil industry is a study of contemporary organizations.

The framework of control requires considerable development in organization analysis. Nonetheless, as this paper has sought to demonstrate, there is a substantial body of work that, while largely unfamiliar to organization theorists, is potentially fruitful for further theoretical construction and empirical work.

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Footnotes to Organizational Change

James G. March

Five footnotes to change in organizations are suggested. They emphasize the relation between change and adaptive behavior more generally, the prosaic nature of change, the way in which ordinary processes combine with a confusing world to produce some surprises, and the implicit altruism of organizational foolishness.•

INTRODUCTION

Organizations change. Although they often appear resistant to change, they are frequently transformed into forms remarkably different from the original. This paper explores five footnotes to research on organizational change, possible comments on what we know. The intention is not to review the research results but to identify a few speculations stimulated by previous work.

Footnote 1: Organizations are continually changing, routinely, easily, and responsively, but change within them cannot ordinarily be arbitrarily controlled. Organizations rarely do exactly what they are told to do.

Footnote 2: Changes in organizations depend on a few stable processes. Theories of change emphasize either the stability of the processes or the changes they produce, but a serious understanding of organizations requires attention to both.

Footnote 3: Theories of change in organizations are primarily different ways of describing theories of action in organizations, not different theories. Most changes in organizations reflect simple responses to demographic, economic, social, and political forces.

Footnote 4: Although organizational response to environmental events is broadly adaptive and mostly routine, the response takes place in a confusing world. As a result, prosaic processes sometimes have surprising outcomes.

Footnote 5: Adaptation to a changing environment involves an interplay of rationality and foolishness. Organizational foolishness is not maintained as a conscious strategy, but is embedded in such familiar organizational anomalies as slack, managerial incentives, symbolic action, ambiguity, and loose coupling.

STABLE PROCESSES OF CHANGE

A common theme in recent literature, particularly in studies of the implementation of public policy, is that of attempts at change frustrated by organizational resistance. There are well-documented occasions on which organizations have failed to respond to change initiatives or have changed in ways that were, in the view of some, inappropriate (Gross, Giaquinta, and Bernstein, 1971; Nelson and Yates, 1978).

What most reports on implementation indicate, however, is not that organizations are rigid and inflexible, but that they are impressively imaginative (Pressman and Wildavsky, 1973; Bardach, 1977). Organizations change in response to their environments, but they rarely change in a way that fulfills the intentions of a particular group of actors (Attewell and Gerstein, 1979; Crozier, 1979). Sometimes organizations ignore clear instructions; sometimes they pursue them more forcefully than was intended; sometimes they protect policymakers from

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folly; sometimes they do not. The ability to frustrate arbitrary intention, however, should not be confused with rigidity; nor should flexibility be confused with organizational effectiveness. Most organizational failures occur early in life when organizations are small and flexible, not later (Aldrich, 1979). There is considerable stability in organizations, but the changes we observe are substantial enough to suggest that organizations are remarkably adaptive, enduring institutions, responding to volatile environments routinely and easily, though not always optimally.

Because of the magnitude of some changes in organizations, we are inclined to look for comparably dramatic explanations for change, but the search for drama may often be a mistake. Most change in organizations results neither from extraordinary organizational processes or forces, nor from uncommon imagination, persistence or skill, but from relatively stable, routine processes that relate organizations to their environments. Change takes place because most of the time most people in an organization do about what they are supposed to do; that is, they are intelligently attentive to their environments and their jobs. Bureaucratic organizations can be exceptionally ineffective, but most of the organizations we study are characterized by ordinary competence and minor initiative (Hedberg, Nystrom, and Starbuck, 1976). Many of the most stable procedures in an organization are procedures for responding to economic, social, and political contexts. What we call organizational change is an ecology of concurrent responses in various parts of an organization to various interconnected parts of the environment. If the environment changes rapidly, so will the responses of stable organizations; change driven by such shifts will be dramatic if shifts in the environment are large.

The routine processes of organizational adaptation are subject to some complications, and a theory of change must take into account how those processes can produce unusual patterns of action. Yet, in its fundamental structure a theory of organizational change should not be remarkably different from a theory of ordinary action. Recent research on organizations as routine adaptive systems emphasizes six basic perspectives for interpreting organizational action:

1. **Rule following.** Action can be seen as the application of standard operating procedures or other rules to appropriate situations. The underlying process is one of matching a set of rules to a situation by criteria of appropriateness. Duties, obligations, roles, rules, and criteria evolve through competition and survival, and those followed by organizations that survive, grow, and multiply come to dominate the pool of procedures. The model is essentially a model of selection (Nelson and Winter, 1974).

2. **Problem solving.** Action can be seen as problem solving. The underlying process involves choosing among alternatives by using some decision rule that compares alternatives in terms of their expected consequences for antecedent goals. The model is one of intendedly rational choice under conditions of risk and is familiar in statistical decision theory, as well as microeconomic and behavioral theories of choice (Lindblom, 1958; Cyert and March, 1963).

3. **Learning.** Action can be seen as stemming from past learning. The underlying process is one in which an organization is conditioned through trial and error to repeat behavior that has been successful in the past and to avoid behavior that has been unsuccessful. The model is one of experiential learning (Day and Groves, 1975).

4. **Conflict.** Action can be seen as resulting from conflict among individuals or groups representing diverse interests. The underlying process is one of confrontation, bargaining, and coalition, in which outcomes depend on the initial preferences of actors weighted by their power. Changes result from shifts in the mobilization of participants or in the resources they control. The model is one of politics (March, 1962; Gamson, 1968; Pfeffer, 1981).

5. **Contagion.** Action can be seen as spreading from one organization to another. The underlying process is one in which variations in contact among organizations and in the attractiveness of the behaviors or beliefs being imitated affect the rate and pattern of spread. The model is one of contagion and borrows from studies of epidemiology (Rogers, 1962; Walker, 1969; Rogers and Shoemaker, 1971).

6. **Regeneration.** Action can be seen as resulting from the intentions and competencies of organizational actors. Turnover in organizations introduces new members with different attitudes, abilities, and goals. The underlying process is one in which conditions in the organization (e.g., growth, decline, changing requirements for skills) or deliberate strategies (e.g., cooptation, raiding of competitors) affect organizational action by changing the mix of participants. The model is one of regeneration (Stinchcombe, McDill, and Walker, 1968; White, 1970; McNeil and Thompson, 1971).

These six perspectives are neither esoteric, complicated, nor mutually exclusive. Although we may sometimes try to assess the extent to which one perspective or another fits a particular situation, it is quite possible for all six to be pertinent or for any particular history to involve them all. An organization uses rules, problem solving, learning, conflict, contagion, and regeneration to cope with its environment, actively adapt to it, avoid it, seek to understand, change, and contain it. The processes are conservative. That is, they tend to maintain stable relations, sustain existing rules, and reduce differences among organizations. The fundamental logic, however, is not one of stability in behavior; it is one of responsiveness. The processes are stable; the resulting actions are not.

SOME COMPLEXITIES OF CHANGE

Organizations change in mundane ways, but elementary processes sometimes produce surprises in a complex world. As illustrations of such complexities, consider five examples: the unanticipated consequences of ordinary action, solution-driven problems, the tendency for innovations and organizations to be transformed during the process of innovation, the endogenous nature of created environments, and the interactions among the system requirements of individuals, organizations, and environments.

Unanticipated Consequences of Ordinary Action

Each of the six perspectives on action described above portrays organizations as changing sensibly; that is, solving problems, learning from experience, imitating others, and regenerating their capabilities through turnover of personnel. These processes, however, may be applied under conditions which, though difficult to distinguish from usual conditions, are sufficiently different to lead to unanticipated outcomes. In particular, we can identify three such conditions:

First, the rate of adaptation may be inconsistent with the rate of change of the environment to which the organization is adapting. Unless an environment is perfectly stable, of course, there will always be some error arising from a history-dependent process (e.g., learning, selection); but where an environment changes quickly relative to the rate at which an organization adapts, a process can easily lose its claim to being sensible. It is also possible for an anticipatory process (e.g., problem solving) to result in changes that outrun the environment and thereby become unintelligent. Second, the causal structure may be different from that implicit in the process. If causal links are ignored, either because they are new, or because their effects in the past have been benign, or because the world is inherently too complex, then changes that seem locally adaptive may produce unanticipated or confusing consequences. Such outcomes are particularly likely in situations in which belief in a false or incomplete model of causality can be reinforced by confounded experience. Third, concurrent, parallel processes of *prima facie* sensibility may combine to produce joint outcomes that are not intended by anyone and are directly counter to the interests motivating the individual actions (Schelling, 1978).

Most of the time, these unanticipated outcomes are avoided, but they are common. Consider the following illustrations:

Learning from the response of clients. Clients and customers send signals to organizations, the most conspicuous one being the withdrawal of their patronage. We expect organizations to respond to such signals. For example, although customer withdrawal is a major device used by market organizations to maintain product quality, it is not always effective. As Hirschman (1970) observed, it is likely that the first customers to abandon a product of declining quality will be those customers with the highest quality standards. If it is assumed that new customers are a random sample from the market, a firm is left with customers whose standards are, on the average, lower and who complain less about the reduced quality. This leads to further decay of quality, and the cycle continues until the quality consciousness of new customers equals that of lost customers; i.e., until the firm's most quality-conscious customers are no more concerned about quality than the average customers in the market. This cycle of regeneration can lead to a fairly rapid degradation in product or service.

Rewarding friends and coopting enemies. Employees of governmental regulatory agencies sometimes subsequently become employees of the organizations they regulate. The flow of people presumably affects the relations between the organizations. In particular, the usual presumption is that expectations of future employment will lead current governmental officials to treat the organizations involved more favorably than they would otherwise. However, if the regulated organizations provide possible employment as an incentive for favorable treatment, they risk producing a pattern of turnover in the regulatory agency in which friends leave the agency, and only those unfriendly to the organization remain. Alternatively, some organizations attempt to coopt difficult people (e.g., rebels), on the assumption that cooptation leads to controlled change, since opponents are socialized and provided with modest success. However, insofar as the basic strategy of cooptation is to strip leadership from opposition groups by inducing opposition leaders to accept more legitimate roles, a conspicuous complication is the extent to which cooptation provides an incentive for being difficult, and thereby increases, rather than reduces opposition.

Competency multipliers. Organizations frequently have procedures to involve potentially relevant people in decision making, planning, budgeting, or the like. The individuals vary in status, knowledge about a problem, and interest in it. Initial participation rates reflect these variations; however, individuals who participate slightly more than others become slightly more competent at discussing the problems of the group than others. This induces them to participate even more, which makes them even more competent. Before long, the de facto composition of the group can change dramatically (Weiner, 1976). More generally organizations learn from experience, repeating actions that are successful. As a result, they gain greater experience in areas of success than in areas of failure. This increases their capabilities in successful areas, thus increasing their chances of being successful there. The sensibleness of such specialization depends on the relation between the learning rates and the rate of change in the environment. The process can easily lead to misplaced specialization if there are infrequent, major shifts in the environment.

Satisficing It has been suggested that organizations satisfice, that is, that they seek alternatives that will satisfy a target goal rather than look for the alternative with the highest possible expected value (March and Simon, 1958; Cyert and March, 1963). Satisficing organizations can be viewed as organizations that maximize the probability of achieving their targets, but it is not necessary to assume quite such a precise formulation to suggest that organizations that satisfice will follow decision rules that are risk avoiding in good times, when the best alternatives have expected values greater than the target, and risk seeking in bad times, when the best alternatives have expected values less than the target (Tversky and Kahneman, 1974). As is noted below, the association of risk-seeking behavior with adversity requires some qualification; but insofar as such a pattern is common, it has at least two important consequences. First, organizations that are facing bad times will follow riskier and riskier strategies, thus simultaneously increasing their chances of survival through the present crisis and reducing their life expectancy. Choices that seek to reverse a decline, for example, may not maximize expected value. As a result, for those organizations that do not survive, efforts to survive will have speeded the process of failure (Hermann, 1963; Mayhew, 1979). Second, if organizational goals vary with organizational performance and the performance of other comparable organizations, most organizations will face situations that are reasonably good most of the time. Consequently, the pool of organizations existing at any time will generally include a disproportionate number that are risk-avoiding.

Performance criteria. Organizations measure the performance of participants. For example, business firms reward managers on the basis of calculations of profits earned by different parts of the organization. The importance of making such links precise and visible is a familiar theme of discussions of organizational control, as is the problem of providing similar performance measures in non-business organizations. However, in an organization with a typical mobility pattern among managers, these practices probably lead to a relative lack of concern about long-term consequences of present action. Performance measurement also leads to exaggerated concern with accounts, relative to product and technology. Measured performance can be improved either by changing performance or by changing the accounts of performance. Since it is often more efficient, in the short run, to devote effort to the accounts rather than to performance (March, 1978a), a bottom-line ideology may overstimulate the cleverness of organizational participants in manipulating accounts.

Superstitious learning. Organizations learn from their experience, repeating actions that have been associated with good outcomes, avoiding actions that have been associated with bad ones. If the world makes simple sense, and is stable, then repeating actions associated with good outcomes is intelligent. Yet relative to the rate of our experience in it, the world is sometimes neither stable enough nor simple enough to make experience a good teacher (March and Olsen, 1976). The use of associational, experiential learning in complex worlds can result in superstitious learning (Lave and March, 1975). Consider, for example, the report by Tversky and Kahneman (1974) of the lessons learned by pilot trainers who experimented with rewarding pilots who make good landings and punishing pilots who make bad ones. They observe that pilots who are punished generally improve on subsequent landings, while pilots who are praised generally do worse. Thus, they learn that negative reinforcement works; positive reinforcement does not. The learning is natural, but the experience, like all experience, is confounded, in this case by ordinary regression to the mean.

These six examples of unanticipated consequences are illustrative of the variation in behavior that can be generated by elementary adaptive processes functioning under special conditions. They suggest some ways in which undramatic features of organizational life can lead to surprising organizational change.

Solution-Driven Problems

There seems to be ample evidence that when performance fails to meet aspirations, organizations search for new solutions (Cyert and March, 1963), that is, for new people, new ways of doing things, new alliances. However, changes often seem to be driven less by problems than by solutions. Daft and Becker (1978) have argued the case for educational organizations and Kay (1979) for industrial organizations; but the idea is an established one, typical of diffusion theories of change.

We can identify at least three different explanations for solution (or opportunity) driven change. In the first, organizations face a large number of problems of about equal importance, but only a few solutions. Thus, the chance of finding a solution to a particular problem is small; if one begins with a solution, however, there is a good chance that the solution will match some problem facing the organization. Consequently, an organization scans for solutions rather than problems, and matches any solution found with some relevant problem. A second explanation is that the linkage between individual solutions and individual problems is often difficult to make unambiguously. Then, almost any solution can be linked to almost any problem, provided they arise at approximately the same time (Cohen, March, and Olsen, 1972; March and Olsen, 1975). When causality and technology are ambiguous, the motivation to have particular solutions adopted is likely to be as powerful as the motivation to have particular problems solved, and many of the changes we observe will be better predicted by a knowledge of solutions than by a knowledge of problems. A third interpretation is that change is stimulated not by adversity but by success, less by a sense of problems than by a sense of competence and a belief that change is possible, natural, and appropriate (Daft and Becker, 1978). Professionals change their procedures and introduce new technologies because that is what professionals do and know how to do. An organization that is modern adopts new things because that is what being modern means. When a major stimulus for change comes from a sense of competence, problems are created in order to solve them, and solutions and opportunities stimulate awareness of previously unsalient or unnoticed problems or preferences.

Transformation of Innovations and Organizations

Students of innovation in organizations have persistently observed that both innovations and organizations tend to be transformed during the process of innovation (Browning, 1968; Brewer, 1973; Hyman, 1973). This is sometimes treated as a measurement problem. In that guise, the problem is to decide whether a change in one organization is equivalent to a change in another, or to determine when a change has been implemented sufficiently to be considered a change, or to disentangle the labeling of a change from the change itself. To treat such problems as measurement problems, however, is probably misleading. Seeing innovations as spreading unchanged through organizations helps link studies of innovation to models drawn from epidemiology; but where a fundamental feature of a change is the way it is transformed as it moves from invention to adoption to implementation to contagion, such a linkage is not helpful

Organizational change develops meaning through the process by which it occurs. Some parts of that process tend to standardize the multiple meanings of a change, but standardization can be very slow, in some cases so slow as to be almost undetectable. When a business firm adopts a new policy (Cyert, Dill, and March, 1958), or a university a new program (March and Romelaer, 1976), specifying what the change means can be difficult, not because of poor information or inadequate analysis, but because of the fundamental ways in which changes are transformed by the processes of change. The developing character of change makes it difficult to use standard ideas of decision, problem solving, diffusion, and the like, because it is difficult to describe a decision, problem solution, or innovation with precision, to say when it was adopted, and to treat the process as having an ending.

Organizations are also transformed in the process. Organizations develop and redefine goals while making decisions and adapting to environmental pressures; minor changes can lead to larger ones, and initial intent can be entirely lost. For example, an organization of evangelists becomes a gym with services attached (Zald and Denton, 1963); a social movement becomes a commercial establishment (Messinger, 1955; Sills, 1957); a radical rock radio station becomes an almost respectable part of a large corporation (Krieger, 1979); and a new governmental agency becomes an old one (Selznick, 1949; Sproull, Weiner, and Wolf, 1978).

These transformations seem often to reflect occasions on which actions taken by an organization (for whatever reasons) become the source of a new definition of objectives. The possibility that preferences and goals may change in response to behavior is a serious complication for rational theories of choice (March, 1972, 1978a). Organizations' goals, as well as the goals of individuals in them, change in the course of introducing deliberate innovations, or in the course of normal organizational drift. As a result, actions affect the preferences in the name of which they are taken; and the discovery of new intentions is a common consequence of intentional behavior.

Created Environments

In simple models of organizational change, it is usually assumed that action is taken in response to the environment but that the environment is not affected by organizational action. The assumptions are convenient, but organizations create their environments in part, and the resulting complications are significant. For example, organizations are frequently combined into an ecology of competition, in which the actions of one competitor become the environment of another. Each competitor, therefore, partly determines its own environment as the competitors react to each other, a situation familiar to studies of prey-predator relations and markets (Mayr, 1963; Kamien and Schwartz, 1975). Also, if we think of adaptation as learning about a fixed environment, the model is somewhat different from one in which the environment is simultaneously adapting to the organization. The situation is a common one. Parents adapt to children at the same time that children adapt to parents, and customers and suppliers adapt to each other. The outcomes are different from those observed in the case of adaptation to a stable environment, with equilibria that depend on whether the process is one of hunting or mating and on the relative rates of adaptation of the organization and the environment (Lave and March, 1975). Finally, organizations create their own environments by the way they interpret and act in a confusing world. It is not just that the world is incompletely or inaccurately perceived (Slovic, Fischoff, and Lichtenstein, 1977; Nisbet and Ross, 1980), but also that actions taken as a result of beliefs about the environment do, in fact, construct the environment, as, for example, in self-fulfilling prophecies and the construction of limits through avoidance of them (Meyer and Rowan, 1977; Weick, 1977, 1979).

It is possible, of course, for organizations to act strategically in an environment they help create, but created environments are not ordinarily experienced in a way different from other environments. For example, the experience of learning in a situation in which the environment is simultaneously adapting to the organization is not remarkably different from the experience of learning in simpler situations. The outcomes are, however, distinctive. When environments are created, the actions taken by an organization in adapting to an environment are partly responses to previous actions by the same organization, reflected through the environment. A common result is that small signals are amplified into large ones, and the general implication is that routine adaptive processes have consequences that cannot be understood without linking them to an environment that is simultaneously, and endogenously, changing.

Individuals, Organizations, and Environments

Although it is an heroic simplification out of which theoretical mischief can come, it is possible to see an organization as the intermeshing of three systems: the individual, the organization, and the collection of organizations that can be called the environment. Many of the complications in the study of organizational change are related to the way those three systems intermesh, as is reflected in the large number of studies that discuss managing change in terms of the relations between organizations and the individuals who inhabit them (Coch and French, 1948; Burns and Stalker, 1961; Argyris, 1965), between organizations and their environment (Starbuck, 1976; Aldrich, 1979), and among organizations (Evan, 1966; Benson, 1975).

Much of classical organization theory addresses the problems of making the demands of organizations and individuals consistent (Barnard, 1938; Simon, 1947; March and Simon, 1958); the same theme is frequent in modern treatments of information (Hirschleifer and Riley, 1979) and incentives (Downs, 1967). Although it is an old problem, it continues to be interesting for the analysis of organizational change. In particular, it seems very likely that both the individuals involved in organizations and systems of organizations have different requirements for organizational change than the organization itself. For example, individual participants in an organization view their positions in the organizations, e.g., their jobs, as an important part of their milieu. They try to arrange patterns of stability and variety within the organization to meet their own desires. However, there is no particular a priori reason for assuming that individual desires for change and stability will be mutually consistent or will match requirements for organizational survival. Moreover, the survival of an organization is a more compelling requirement for the organization than it is for a system of organizations. Survival of the system of organizations may require organizational changes that are inappropriate for the individual organization; it may require greater organizational flexibility or rigidity than makes sense for the individual organization. The organizational failure rates that are optimal for systems of organizations are somewhat different from those that are optimal for individual organizations. Complications such as these are common in any combination of autonomous systems. They form a focus for some standard issues in contemporary population genetics (Wright, 1978), as well as extensions of those ideas into social science in general (Wilson, 1975; Hannan and Freeman, 1977).

That observed systems of individuals, organizations, and environments have evolved to an equilibrium is questionable, but it is possible that some of the features of organizations that seem particularly perverse make greater sense when considered from the point of view of the larger system of organizations.

Other illustrations of complications could easily be added, including problems introduced by the ways in which humans make inferences (Nisbet and Ross, 1980), and by the ways in which organizational demography affects regeneration (Reed, 1978). Each of the complications represents either a limitation in one of the standard models or a way in which a model of adaptation can be used to illuminate organizational change under complicated or confounding conditions. Familiar activities, rules, or procedures sometimes lead to unanticipated consequences.

FOOLISHNESS, CHANGE, AND ALTRUISM

Organizations need to maintain a balance (or dialectic) between explicitly sensible processes of change (problem-solving, learning, planning) and certain elements of foolishness that are difficult to justify locally but are important to the broader system (March, 1972, 1978a; Weick, 1979). Consider, for example, a classic complication of long-range planning. As we try to anticipate the future, we will often observe that there are many possible, but extremely unlikely, future events which would dramatically change the consequences of present actions and thus the appropriate choice to be made now. Because there are so many very unlikely future events that can be imagined, and each is so improbable, we ordinarily exclude them from our more careful forecasts, though we know that some very unlikely events will certainly occur. As a result, our plans are based on a future that we know, with certainty, will not be realized. More generally, if the most favorable outcomes of a particular choice alternative depend on the occurrence of very unlikely events, the expected value of that alternative will be low, and it would not be sensible to choose it. Thus, the best alternative after the fact is unlikely to be chosen before the fact by a rational process. For similar reasons, the prior expected value of any specific innovation is likely to be negative, and organizations are likely to resist proposals for such change. Indeed, we would expect that an institution eager to adopt innovative proposals will survive less luxuriantly and for shorter periods than others. Though some unknown change is almost certainly sensible, being the first to experiment with a new idea is not likely to be worth the risk.

The problem becomes one of introducing new ideas into organizations at a rate sufficient to sustain the larger system of organizations, when such action is not intelligent for any one organization. The conventional solution for such problems involves some kind of collaboration that pools the risk (Hirschleifer and Riley, 1979). Explicit risk-sharing agreements exist, but for the most part, organizational systems have evolved a culture of implicit altruism which introduces decentralized nonrational elements into rational choice procedures rather than relying on explicit contractual arrangements. These cultural elements of manifest foolishness have latent implications for innovation and change in organizations. New ideas are sustained in an organization by mechanisms that shield them, altruistically, from the operation of normal rationality, for example, by organizational slack, managerial incentives, symbolic action, ambiguity, and loose coupling.

Slack protects individuals and groups, who pursue change for personal or professional reasons, from normal organizational controls. As a result, it has been argued that one of the ways in which organizations search when successful is through slack (Cyert and March, 1963; Wilson, 1966). Several studies of change seem to lend support to this idea (Mansfield, 1968; Staw and Szwajkowski, 1975; Manns and March, 1978); but Kay (1979) concludes that it is hard to see consistent evidence for slack search in the data on research and development expenditures. Daft and Becker (1978) suggest that slack is associated not with excess resources but with high salaries and a consequent high level of professionalism.

Since managers and other leaders are selected by a process that is generally conservative (Cohen and March, 1974), it is probably unreasonable to see them as sources of intentional foolishness. Managerial incentives seem unlikely to stimulate managerial playfulness; incentive schemes try to tie individual rewards to organizational outcomes, so that managers help themselves by helping the organization. The ideology of good management, however, associates managers with the introduction of new ideas, new organizational forms, new technologies, new products, new slogans, or new moods. Consequently, some fraction of organizational resources is dedicated to running unlikely experiments in changes as unwitting altruistic contributions to the larger world.

Choice and decision making touch some of the more important values of modern developed cultures, and thereby become major symbolic domains in contemporary organizations. Symbolic values including those associated with change, are important enough and pervasive enough to dominate other factors in a decision situation (Christensen, 1976; Kreiner, 1976; Feldman and March, 1981). Symbolism shades into personal motivations easily for professionals (e.g., engineers, doctors) or managers, since they express their competence and authority by the introduction of changes or symbols of changes (Daft and Becker, 1978). In a more general way, the symbolic elaboration of processes of choice becomes more important than the outcomes, and the outcomes thus reflect more foolishness than would otherwise be expected.

Organizations do not always have a well-defined set of objectives; their preferences are frequently ambiguous, imprecise, inconsistent, unstable, and affected by their choices (March, 1978a; Elster, 1979). As a result, problem solving and decision making assume some of the features of a garbage can process (Cohen, March, and Olsen, 1972), learning becomes confounded by the ambiguity of experience (Cohen and March, 1974; March and Olsen, 1976), and actions become particularly sensitive to the participation and attention patterns of organizational actors (Olsen, 1976). Moreover, the uncertainties associated with trying to guess future preferences increase considerably the variance in any estimates that might be made of the expected utility of present action and thus decrease the reliability of the process.

Finally, organizations are complex combinations of activities, purposes, and meanings; they accomplish coordinated tasks that would be inconceivable without them, and without which it is difficult to imagine a modern developed society. This impressive integration of formal organizations should not, however, obscure the many ways in which organizations are loosely coupled. Behavior is loosely coupled to intentions; actions in one part of the organization are loosely coupled to actions in another part; decisions today are loosely coupled to decisions tomorrow (Cohen and March, 1974; March and Olsen, 1976; Weick, 1976, 1979). Such loose coupling does not appear to be avoidable. Rather, limits on coordination, attention, and control are inherent restrictions on the implementation of rationality in organizational action.

These organizational phenomena ensure that some level of foolishness will occur within an organization, no matter how dedicated to rational coordination and control it may be. Although it is easy to argue that foolishness is a form of altruism by which systematic needs for change are met, it is much harder to assess whether the mixture of rationality and foolishness that we observe in organizations is optimal. The ideology underlying the development of decision engineering probably underestimates the importance of foolishness, and the ideology underlying enthusiasm for some versions of undisciplined creativity probably underestimates the importance of systematic analysis. What is much more difficult is to determine whether a particular real system errs on the side of excessive reason or excessive foolishness. We can solve the problem of appropriate foolishness within a specific model by assuming some characteristics of the environment over the future; solving the problem in a real situation, however, is not ordinarily within our ability.

Nor is it easy to devise realistic insurance, information, or contractual schemes that will reliably ensure reaching an optimum. Not only are the difficulties in analysis substantial, but, quite aside from those problems, there is also a difficulty posed by the cultural character of the existing solution. The mix of organizational foolishness and rationality is deeply embedded in the rules, incentives, and beliefs of the society and organization. It is possible to imagine changing the mix of rules, thereby changing the level of foolishness; but it is hard to imagine being able to modify broad cultural and organizational attributes with much precision or control.

DISCUSSION

The five footnotes to organizational change suggested at the outset are comments on change, not a theory of change. Nevertheless, they may have some implications for organizational leadership and for research on adaptation in organizations. The general perspective depends on the proposition that the basic processes by which organizations act, respond to their environments, and learn are quite stable, and possibly comprehensible. These stable processes of change, however, produce a great variety of action and their outcomes are sometimes surprisingly sensitive to the details of the context in which they occur.

A view of change as resulting from stable processes realized in a highly contextual and sometimes confusing world emphasizes the idea that things happen in organizations because most of the time organizational participants respond in elementary ways to the environment, including that part of the environment that might be called management or leadership. Managers and leaders propose changes, including foolish ones; they try to cope with the environment and to control it; they respond to other members of the organization; they issue orders and manipulate incentives. Since they play conventional roles, organizational leaders are not likely to behave in strikingly unusual ways. And if a leader tries to march toward strange destinations, an organization is likely to deflect the effort. Simply to describe leadership as conventional and constrained by organizational realities, however, is to risk misunderstanding its importance. Neither success nor change requires dramatic action. The conventional, routine activities that produce most organizational change require ordinary people to do ordinary things in a competent way (March, 1978b). Moreover, within some broad constraints, the adaptiveness of organizations can be managed. Typically, it is not possible to lead an organization in any arbitrary direction that might be desired, but it is possible to influence the course of events by managing the process of change, and particularly by stimulating or inhibiting predictable complications and anomalous dynamics.

Such a view of managing organizations assumes that the effectiveness of leadership often depends on being able to time small interventions so that the force of natural organizational processes amplifies the interventions. It is possible to identify a few minor rules for such actions (Cohen and March, 1974), but a comprehensive development of managerial strategies (as well as of effective strategies for frustrating managers) requires a more thorough understanding of change in organizations, not a theory of how to introduce any arbitrary change, but a theory of how to direct somewhat the conventional ways in which an organization responds to its environment, experiences, and anticipations. The footnotes to change elaborated in this paper are much too fragmentary for such a task, but they indicate a possible way of understanding change. They argue for considering the fundamental adaptive processes by which change occurs, in terms of broader theoretical ideas about organizational action. They direct attention particularly to how substantial changes occur, as the routine consequence of standard procedures or as the unintended consequence of ordinary adaptation. And they suggest that understanding organizational change requires discovering the connections between the apparently prosaic and the apparently poetic in organizational life.

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Effects of Environmental Uncertainty on Information and Decision Processes in Banks

Huseyin Leblebici and Gerald R. Salancik

The effect of environmental diversity and volatility on decision-making strategies is examined for 41 independent banks. Uncertainty is defined and measured in terms of an entropy equation, which combines environmental and probabilistic sources of decision uncertainty. Uncertainty was associated with loan managers' perceptions of the uncertainty of loan repayments and the information they collected before deciding on a loan application. The normal operations procedures used by the banks to process loans varied with the diversity, but not the volatility, of their environment. Volatility was associated with the uncertainty experienced for particular decisions. A theoretical framework with the implication of the two sources of uncertainty is discussed.•

Studies in the past decade have raised important theoretical and empirical questions about how environmental conditions affect the functions and structures of organizations (Lawrence and Lorsch, 1967; Thompson, 1967; Duncan, 1972, 1973; Downey, Hellriegel, and Slocum, 1975; Hannan and Freeman, 1977; Aldrich, 1979). The general proposition has been that organizations were structured to adapt them to the uncertainty arising from interactions with the environment. These studies, however, have been criticized, because uncertainty is difficult to measure clearly or reliably (Tosi, Aldag, and Storey, 1973; Downey, Hellriegel, and Slocum, 1975; Pfeffer, 1977).

This paper presents a study of the effects of environmental uncertainty on the structure and decision making in the loan departments of 41 independent banks. It is argued that environmental conditions affect organizational functioning through the particular uncertainties created for particular decisions and that the character of environmental uncertainty must be included in an analysis of its effect on organizational decision making.

BACKGROUND AND THEORETICAL ANALYSIS

Much of the search for understanding organization-environment relationships began with an attempt to define a set of dimensions of environments. Typologies such as those of Thompson (1967), Lawrence and Lorsch (1967), and Duncan (1972) are typical. Though these typologies differ in particulars, each categorizes environments into two components, (1) the range of an organization's environmental activities, here referred to as the diversity of the environment, and (2) the rate of change among those activities, here referred to as the volatility of the environment.

It is not difficult to appreciate how diversity and volatility can create uncertainty for an organization. In a simple case, if an organization had to service diverse consumer markets, it would have to identify and respond to the individual preferences of each, constantly confronting the possibility that what sells well in one market may fail in another. The probability of diverse markets agreeing on some common product is quite small. Similarly, if the preferences of any particular product market were erratic and unstable, such that one desire gave way to others unpredictably from one period to another, then supplying that market would, of necessity, be uncertain.

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Effects of Uncertainty

Although it is clear that diversity and volatility are related to organizational functioning, investigators in this area have failed to appreciate the need to specify particular conditions of uncertainty. Studies in this area have been more global, designed to characterize an organizational environment abstractly, removed from its particulars. Such underspecification has been the basis of the chief criticism (Miles, Snow, and Pfeffer, 1974) of such studies.

One solution to the criticism of generality has been to characterize environments by perceived uncertainty; however, this, too, is a limited measure, for perceptual measures of uncertainty have been found inadequate (Tosi, Aldag, and Storey, 1973; Downey, Hellriegel, and Slocum, 1975; Pfeffer, 1977). Still, this interest in perceived uncertainty is desirable, since it recognizes that uncertainty is not just a property of the environment but of the observer faced with a decision in an environment. Still missing from this theoretical development, however, is an explication of the way in which environmental conditions contribute to the experience of uncertainty and the response to uncertainty in decisions. One attempt to integrate uncertainty and decision making has been made by Thompson and his colleagues. Thompson (1964, 1967) argued that decision making involved two sources of uncertainty: (1) disagreements about cause-effect relations, and (2) disagreements about preferred outcomes. Thompson and Tuden (1959) had earlier defined four classes of decisions and argued that each required a different decision strategy and structure. Given agreement about preferences, one could use computational strategies when means-ends relations were certain and judgmental strategies when they were uncertain. Similarly, if there were no agreement about preferred outcomes, inspirational strategies would prevail when causal beliefs were uncertain while compromise bargaining strategies would otherwise. Each source of disagreement requires not only a different decision strategy, but also different organizational structure.

Thompson and Tuden's (1959) reasoning implies that the perception of uncertainty comes not from an awareness of the environment, which is unlikely, but from an awareness of the uncertainty particular to decision situations. Consequently the structural devices and procedures that organizations develop to deal with uncertainty come not from any direct association with the global qualities of the environment but in response to the different decision situations in the organization.

It is difficult, however, to apply Thompson and Tuden's conceptualization directly to predict decision making and information processing structures in organizations, because their concept of uncertainty does not make explicit how environmental conditions effect decision uncertainty. The two basic dimensions of the environment defined by subsequent authors (e.g., Duncan, 1972) — volatility and diversity — must also be included in Thompson and Tuden's conceptualization in order to generate generalizable propositions. The two dimensions are quite different in their implications, however; diversity is a source of uncertainty that can be anticipated; volatility cannot be anticipated, for by definition, it is unpredictable change within environmental domains. Those aspects of the environment that are related to diversity will be reflected in the formalized and routine information-collecting and -processing procedures which sort environmental elements into homogeneous classes. This is not in accord with Thompson and Tuden's argument, which suggests that when preferences are agreed upon, uncertainty leads to less formalization and routine. In the case of uncertainty, it can be argued that a rapidly changing environment requires flexibility of response, which could evolve a more consultative, judgmental response to individual decision cases. Such an expectation is premised on the general information theory that procedures are used to reduce uncertainty.

Since uncertainties can only be experienced through decision making in an organization, it is necessary to consider the implications that specific environmental conditions might have for the particular decisions and the information-processing activities that are developed for those decisions. Consequently, the two kinds of decision uncertainty must be distinguished theoretically and methodologically. Here it is argued that uncertainty is a property of decision situations, and an attempt is made to develop a measure of uncertainty that is a product of the organizational environment and the decision situation. The study was an investigation of the effect of uncertainty, so defined, on organizational decision making.

Definition of Decision Uncertainty

The preceding discussion suggests two sources of uncertainty. The first relates to environmental conditions, such as diversity and volatility, which act upon an organization to create uncertain outcomes. The second relates to a decision situation, to disagreements about cause-effect relationships or preferences. A basic definition should incorporate both. The definition developed here incorporates uncertainty arising from environmental conditions with that arising from agreements about the cause-effect relationship. It does not include disagreements about preferences, as they would require a different theoretical argument.

Uncertainty is a state which characterizes a given decision situation within a given environment (or context). In terms of the cause-effect inferences of organizational decision making, uncertainty is the state arising from predicting outcomes from the actions taken to achieve them; the more one is able to predict outcomes, the less the uncertainty. Since outcomes are the result of conditions beyond the actions taken to produce them, uncertainty is a function of both one's knowledge of cause-effect relationships and the probabilistic conditions of the environment within which outcomes take place. For this study, uncertainty derives from the conditions that enable loan officers to predict the probability that a given loan applicant will repay the bank's loan. For this, loan officers collect information to reduce uncertainty about this probability. Without information, uncertainty is maximal. However, if an applicant with an annual income of $30,000 has lived and worked steadily in the community for fifteen years and has had a good credit rating, a bank may expect that conditions are sufficient for repayment and experience a low degree of uncertainty. Were the bank to be operating in a community with changing economic conditions, however, such information might be insufficient to permit the same degree of certainty. For reasons having nothing to do with the applicant's current propensity or ability to repay, given the facts known about him or her, conditions could arise that raised questions about whether the income, credit rating, etc. could be predictive. For an organization operating within a volatile environment, the diagnostic value of any given knowledge of effects may change as conditions change, even though the causal structure of the situation remains the same. The decision would be more uncertain, and more information would be required to reduce that uncertainty.

Uncertainty is closely allied to the probabilistic character of outcomes. This relationship suggests two common measures for uncertainty, variance, perhaps the most common, and entropy, a less familiar measure. For variance, if A_i is taken as the outcome relevant to an organizational decision and $P(a_i)$ as its probability, then the variance of the probability is $b(P - P^2)$, where b is a scale multiplier that may be used to represent the volatility of an environment or other independent sources of uncertainty. The function is curvilinear with a maximum at $P = .5$, for all values of b.

Entropy, which plays a significant role in information theory (White, 1969), can be used to define the interrelationship of the uncertainty in the environment, the amount of information, and the probabilities of alternative courses of actions for a single decision. Thus, given a set of finite probability space composed of possible outcomes A_i, with the associated probabilities $p(A_i)$, the entropy equation can define the amount of uncertainty associated with this space, as follows,

$$E(A) = -\lambda \sum_{i=1}^{n} p(A_i) \log p(A_i).$$

One advantage of an entropy measure over variance is that it is associated directly with the amount of information contained in space A. If $E(A)$ is zero, then the amount of information associated with a decision situation completely eliminates the uncertainty in that space. Shannon's (1948) fundamental inequality can be used to show that for two dependent finite event spaces, the amount of uncertainty in one space either decreases or remains the same, if it is known which event occurred in the other space. In other words, uncertainty associated with a decision situation is reduced with added information (Khinchin, 1957). The implication of this concept of uncertainty for human information processing and judgment has been outlined by Garner (1962).

In the entropy equation, λ is generally taken to be a constant with value 1, much as b in the variance equation is taken as 1. In this paper, however, the value of λ is considered a variable scaling factor and is defined as volatility in a given environment. Figure 1 shows decision uncertainty under varying conditions of environmental volatility and the probability of an outcome. Note that the inherent uncertainty associated with a binary decision of a given probability is a curvilinear function for all levels of volatility, λ. As λ increases to reflect the volatility in the environment, then the amount of entropy increases. The λ represents a constant for a given decision environment but varies across the environments of different organizations. It is a scale multiplier, similar to Duncan's (1972) definition of the external environment.

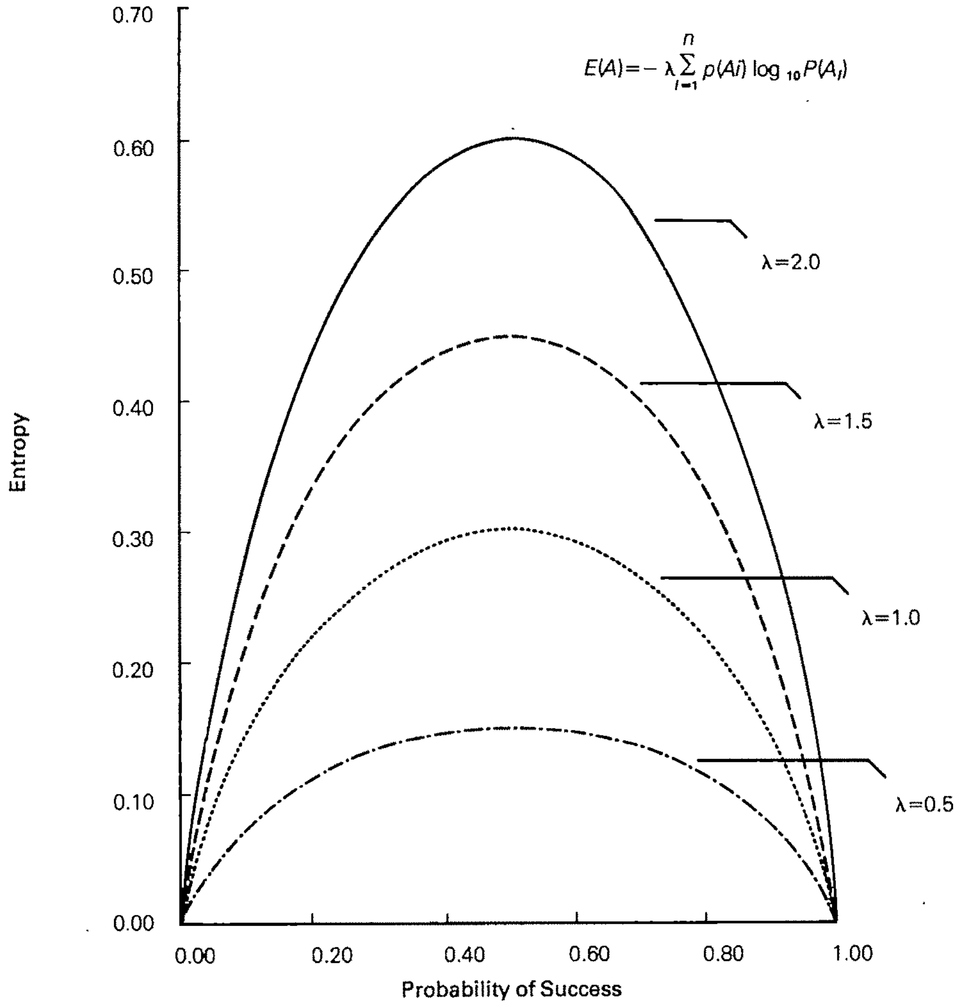

Figure 1. Hypothetical distribution of entropy values, *E*(*A*), for different values of λ.

Hypotheses

Within the context of the decision making of the bank loan departments being studied, several hypotheses were derived from the assumptions about uncertainty. The first two merely restate the basic theorems from information theory and its implications for decision situations. They are important only as indications that it is uncertainty and information in organizational decision making that are being studied. If the hypotheses were not supported, it would be questionable whether decision uncertainty was being measured.

Hypothesis 1a. For a given decision situation, the relationship between the repayment probabilities assigned loan applications and the perceived uncertainty will be curvilinear.[1]

Hypothesis 1b. For a given decision situation, the relationship between the entropic measure of uncertainty (decison entropy) and the uncertainty that decision makers report will be linear and positive.

The second hypothesis, based on Shannon's fundamental inequality, concerns the amount of information required to reduce the level of uncertainty. Because uncertainty has two sources, this hypothesis is stated in two parts.

Hypothesis 2a. The greater the uncertainty of the environment, the greater the information collected for a given class of decisions.

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[1] The precise curvilinear relationship cannot be specified at this point, since too little empirical work has been done. However, it should be of the general form $U = c\, p^a (1-P)^b$, where a, b and c are coefficients. When $a = b = c = 1$, the equation is the variance of a probability.

Hypothesis 2b. The greater the uncertainty of a particular decision, the greater the amount of information collected for a given decision.

The second hypothesis does not necessarily apply directly to a particular organizational situation. Unfortunately, there have been no theoretical studies of the effect of various sources of uncertainty on the gathering of information; however, by making a few assumptions it is possible to predict what might be expected. First, it should be recognized that information is gathered either for individual decisions or as part of the normal procedures for handling a group of decisions. One could expect that the information that is gathered as normal procedure would reflect environmental conditions of some duration. This expectation is based on the time required for instituting an information system of any complexity. Thus, at a minimum, the information system (a structural feature of an organization) would reflect the environmental conditions for which it was designed. Considering this, and the nature of diversity and volatility, one can further expect that the information collected as part of the normal procedures will more likely reflect the diversity and heterogeneity faced by an organization than the volatility. Diversity is a relatively enduring characteristic of an economic or political community and organizations operating within this diversity would create permanent information systems that sort environmental elements into appropriate segments. This expectation is based, of course, on the assumption that information is gathered to reduce uncertainty.

Volatility, on the other hand, is unlikely to be associated with institutional forms of information gathering, since such forms would require changing information systems with every environment change. For banks, that would require changes in loan application forms with every new turn in the economy. However if this were the case, it would imply that the changes in the economy were not uncertain since they could be readily adapted to, which contradicts the assumption that the environment is volatile. What volatility requires of an organization is flexibility, the ability to shift from permanent procedures to temporary and flexible procedures. High volatility will result in less formal, more variant use of information, which allows more subjective interpretations and more judgmental decision making. Thus, we would expect that volatility will affect information gathering more on a decision by decision basis than as part of the operating structures of the organization. For the present study, volatility should be related to information gathered for particular decison cases. This same line of reasoning leads to a related third hypothesis:

Hypothesis 3. For a given decision case, the higher the volatility of the environment the higher the level of uncertainty.

As Jurkovich (1974) pointed out, it is not surprising that Duncan (1973) found that heterogeneity (diversity) was not associated with perceived uncertainty whereas volatility was. Diversity and complexity, as Simon (1965) noted, results from combining simple elements. Diversity can be dealt with institutionally by disentangling the pieces, or, in marketing environments, by segmenting markets. As a consequence, the uncertainty that characterizes the environment of an organization need not be experienced by individual decision makers, since each is associated more with one piece than with the whole. Volatility, in contrast, is the change that occurs within and among the elements of an environment and is experienced by anyone who must deal with them. Hypothesis 3, then, merely states that this uncertainty is expected to be represented in any individual's decision making. Hypothesis 4 extends this to suggest that decision strategies will also be affected.

Hypothesis 4. The decision procedures of banks and their loan officers will reflect the environmental characteristics and decision uncertainties.

Hypothesis 4a. Banks from more diverse environments will have more routine and formal procedures than banks from less diverse environments.

Hypothesis 4b. Banks from more volatile environments will have more flexible and changeable procedures, more judgmental forms of decision making, and more variation from situation to situation.

Hypothesis 4 is an expression of Thompson's argument that decision making takes judgmental forms when uncertainty is high and computational forms when it is low; however, here we are hypothesizing this only for banks that face uncertainty from a changing environment. Diversity, by its nature, imposes a need to sort environmental elements into more manageable homogeneous classes. Thus, diverse banking environments will have more formal and restrictive decision procedures to permit sorting.

METHODOLOGY

Selection of Sample

The loan departments for study were chosen to satisfy certain design requirements. The sample had to vary organizational settings and decisions in terms of uncertainty, yet be comparable. Moreover, the organizations had to have environmental sources of uncertainty that were likely to impinge on them. Finally, the interest in keeping the study simple called for a setting in which only uncertainty about the predictability of outcomes prevailed and for which simulated decision could be realistically administered; that is, preferences about possible outcomes needed to be constant and certain.

The personal loan departments of banks fit these requirements well. Their general preference function is a straightforward and accepted principle: for short term, small personal loans, the loan officer wants to recover the full loan with interest. The decisions themselves are common and familiar in every bank and based on information communicated by an applicant to the loan officer, making them suitable for simulation. The decision structures and procedures for handling loan applications are readily observed. Most important, banks are excellent sites because they are completely emeshed in their local environments, permitting a sampling of environmental differences and ensuring that the environment will not be so buffered that its effects could not be studied.

Banks are, in many ways, ideal sites for studying environmental variation. Small and medium-size banks are intensely local organizations, affected less by national and federal policies and regulations than by local environmental demands. They have direct contact with their clientele and the economic activities of their local community; in county banks, 80 percent of the loans are given to individuals and companies within five miles of the town, while 80 percent of the depositors come from ten miles around (Vanderwicker, 1974). Interest rates for loans vary widely by locale and client. The kind of community virtually dictates the banking services offered. Rural banks grant farming loans; suburban banks grant consumer credit and mortgage loans. Location also influences a bank's need for liquidity, information, and decision-making structures (Crosse and Hempel, 1973).

Sample

The banks selected for this study were in Illinois, a state with unit bank regulations; i.e., no banks were branches of others, so that each could be analyzed as a unit.

Stratified sampling was used to select banks to represent the different economic activities of the state. The 17 economic areas of the state were grouped into the three groups, ranging from economically most active to least active. Four counties were randomly selected from each group, and five banks were selected randomly from each county.

Data for the study were gathered by a formal questionnaire and from archives. A pilot study was conducted in one county to test the questionnaire format and the naturalness of the simulated decision cases.

The questionnaire was delivered personally to the loan officer of each bank, or to the head of the loan department if there was a loan department. The purpose and instructions for the survey were explained and the questionnaire and return envelope were left with the respondent. Within two weeks, about one-half of the surveys were returned. Personal contacts were made a second time to encourage the remaining respondents. Out of 60 banks, 44 returned the questionnaire; three that were returned were not included in the analysis because of unanswered questions. For the final sample of 41 banks, minor missing information was later collected through telephone conversations.

Three kinds of data were collected from each bank. Information about each county's economic and demographic characteristics was collected from records. Information about the normal operating procedures of the bank in handling loan applications was collected from the loan department. Reactions to specific decisions were obtained by having the loan officer decide on seven hypothetical loan applications and report on procedures to be used for the decision. From these data, relevant measures were developed, e.g., environmental diversity, environmental volatility, and so on.

Measures

Environmental Diversity. Environmental diversity, which was estimated by the economic and demographic characteristics of the county in which the bank resided, included population size, income level, and distribution of labor force between industry and agriculture. Other economic characteristics were included when the sample was stratified, such as work force size, taxable payroll, economic units, assets of business and total deposits. These indicators of the economic diversity in a county were highly intercorrelated.

To develop a single index of diversity, three indicators were selected and factor analyzed. The three were selected because of their high intercorrelations and because they were theoretically and statistically independent of environmental volatility. They were population size, income level, and the distribution of the local labor force between industry and agriculture. Principal-component analysis of their correlations indicated that one factor was sufficient to account for most of their variance (77.27 percent) and was used to generate the diversity values for each local environment.

Environmental Volatility. Environmental volatility was measured by comparing the relative change in the level of unemployment in the county of each bank to national unemployment levels. This operational definition is derived from Gardner's (1973) volatility index for economic communities and is a measure of the change in the locality relative to change in the national economy. The measure is similar to beta coefficients used in financial analysis to represent the risk of a given stock relative to average stock market holdings and can be specified as follows:

$$EC_l^t = a_l + b_l EC_k^t,$$

where *EC* is an economic condition (unemployment in this case), *t* is time taken as years from 1 to *n*, *l* is the local economy and *k* is the national economy. The slope, b_l, is a surrogate for environmental volatility; if b_l is greater than 1, it can be concluded that the local environment is relatively more volatile, or vice versa, if b_l is less than 1.

Volatility was the simple unstandardized regression coefficient for each county's yearly adjusted average unemployment regressed against the national seasonally adjusted unemployment levels for eleven years. The measure of volatility was not significantly correlated with diversity across the 41 banks studied.

Loan Decisions. In order to estimate the uncertainty perceived by loan officers for typical decisions, seven hypothetical personal loan applications were constructed to represent a full range of risk, by varying the information about the loan applicant according to Smith's (1964) analysis of consumer installment credit risk factors. Smith computed indices of probability of default for each of twenty debtor traits. The seven cases were constructed by sampling traits from either the high or low probability ranges and by mixing them to produce a full range of probability from .35 percent to .91. Each application was for a small amount ($2,000 to $10,000) and listed the purpose (i.e., car purchase), along with typical information collected about the applicant. Loan officers reported which cases were typical of the ones that they processed daily, and uncharacteristic ones were eliminated during pilot testing.

The consumer or personal loan officer from each bank was asked to estimate for each case the perceived probability for repayment of the loan and the perceived uncertainty of the probabilities. Moreover, respondents were asked about the decision strategy they would use in handling the application, the authorizations they would need for the decision, and what additional information they would require before making a decision. The decision cases thus represented simulations of their decision process and reasonably represented the way in which they made such decisions. An example of one of the cases is presented in the Appendix, along with the questionnaire used to assess it.

Decision Uncertainty. The perceived uncertainty of each loan decision was estimated by asking respondents to judge on a 7-point scale how certain or uncertain they were about their probability estimates that the loan would be repaid. No interpretation of uncertainty was made beyond this.

Decision Entropy. From the individual probability estimates for each case, a derived measure of the theoretical uncertainty of the loan officer's decision was estimated. The entropy equation for this was $DE=(1-P)\log(1-P)+(P)\log(P)$, where P is the loan officer's probability estimate for a particular case ($\log_{10}$ was used).

Decision Structures and Procedures. In order to measure the banks' structural characteristics relevant to loan decisions, bank officers were asked to report on two separate aspects of decision making. The first aspect dealt with general structural characteristics of decision making including the authority structure, the routine information collected, the method of evaluating credit application, and the amount of loan authorization allowed. The authority structure was measured as the number of hierarchical levels needed for final decision; routine information collection was measured from the total number of items on loan application forms; the method of evaluating the application was measured as ranging from most informal to most formal and structured (i.e., computerized numerical evaluation); and the amount of loans given without higher authorization was measured in dollars allowed. In addition, to estimate the formalization level of loan decisions, bank officers specified whether the bank had a written loan policy and the rules it contained, ranging from loan territory to liquidation of loans (the more extensive the coverage of written loan policy, the more formalized the decision making).

The second aspect of decision making, on the other hand, dealt with the loan decision situations. The loan officers reported on the decision strategy, authorization, and the additional information required for making a decision on each case (see Appendix).

ANALYSIS AND RESULTS

The analysis examined how the uncertainty of decisions within the context of diverse and volatile environments related to the normal and idiosyncratic decision procedures of banks making loans to individuals. The analysis had three parts: (1) determining whether the measures from the study could be taken to represent uncertainty as defined, (2) examining the effects of environmental and decision uncertainty on the collection of information, (3) examining the effects of environmental and decision uncertainty on the decision strategies used by banks and their loan officers.

Evidence for Uncertainty

Before the analysis can be meaningful, it is necessary to establish that the intended measures reflect uncertainty as interpreted in the organizational (Thompson, 1967), psychological (Garner, 1962), and informational theory (Shannon, 1948) literature. Table 1 presents for each hypothetical case the

Table 1

Distribution of Average Values of Main Decision Variables in Seven Decision Cases

Cases*	Probability of repayment (p_i)	Standard deviation of p_i	Perceived uncertainty	Entropy ($\lambda = b_i$)	Entropy ($\lambda = 1$)	New information required for decision
1	91.36	11.47	1.78	.0774	.0994	1.78
4	79.92	20.72	2.48	.1313	.1637	1.92
5	70.70	24.63	2.95	.1616	.1974	1.78
2	50.85	24.87	3.78	.1880	.2413	2.60
7	47.92	23.64	3.48	.1936	.2446	1.68
6	38.90	22.76	3.17	.1886	.2375	1.65
3	34.68	21.23	3.46	.1887	.2324	1.29

*Ranked according to the ascending order of the probability of repayment.

average probability of success assigned by bank officers and the three measures of uncertainty. The variance of the probabilities was computed as a standard deviation, and the entropy measures were derived from the probabilities estimated by respondents, while the perceived uncertainty was the respondents' own estimates. The three should be correlated highly, if they each represent uncertainty, and should be related curvilinearly to the mean probabilities assigned to the case.

The three measures do correlate highly across cases. The correlation between the variance of the individual probability estimates for each case with the mean perceived uncertainty for each case is .85 and with the entropy measure is .93. The

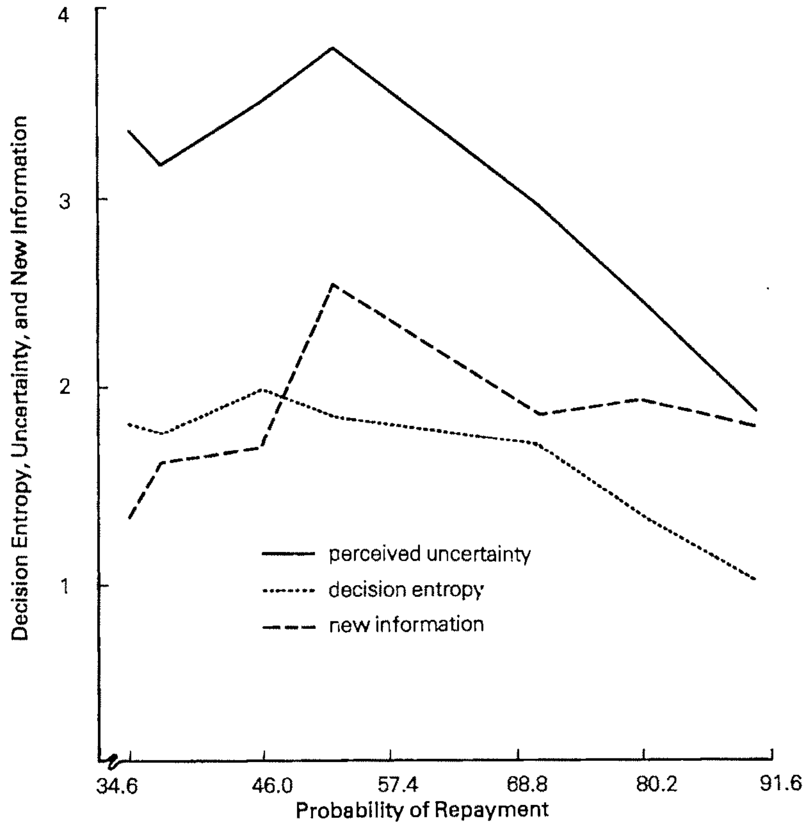

Figure 2. Distributions of the average values of decision entropy, new information, and perceived uncertainty for the seven decision cases. Note: For convenience, the same vertical scale is used for all the variables.

correlation of the entropy measure with the respondents' perceived uncertainty is .97.

A more important condition for validity is that there be a curvilinear relationship between uncertainty measures and the repayment probabilities estimated for each case, as indicated by the decision entropy equation. To test for linearity, the linear and quadratic components of uncertainty measures (Figure 2) were computed for an analysis of variance. For the decision entropy measure both the linear and the quadratic components are significant sources of variation, with *F*(1,280)=23.91 and 11.11 respectively. Similarly, for the perceived uncertainty measure, both the linear and quadratic components are significant, with *F*(1,280)=31.20 and 7.98 respectively (Table 2).

Table 2

Analysis of Variance for Decision Uncertainty Using Average Probabilities of Repayment for Metric Spacing in the Polynomial Function

Source	df	Sum of Squares	Mean of Squares	*F*	*p*
Between Cases	6	137.50			
Due to linear	1	87.15	87.15	31.20	.001
Due to quadratic	1	22.31	22.31	7.98	.005
Departure from quadratic	4	28.04	7.01	2.51	NS
Error	280	782.10	2.79		
Total	286	919.60			

A final condition concerns the relation of information to uncertainty. Since information reduces uncertainty, the same curvilinear relationship should exist between the probability estimates for the seven decision cases and the loan officers' reports about seeking further information. To examine this, the linear and quadratic variance components of reports of required new information were computed for the seven cases arrayed from most to least probable. As shown in Table 3, the linear component was not significant, *F*(1,280)=.97, but the curvilinear component was *F*(1,280)=5.09, consistent with the interpretation that the decison cases reflect differences in uncertainty.

Effect of Environmental Uncertainty

Beyond establishing the theoretical validity of uncertainty measures, the objective was to examine how the environment of an

Table 3

Analysis of Variance for New Information Required Using Average Probabilities of Repayment for Metric Spacing in the Polynomial Function

Source	df	Sum of Squares	Mean of Squares	*F*	*p*
Between cases	6	22.82			
Due to linear	1	1.98	1.98	0.74	.38
Due to quadratic	1	13.55	12.58	5.09	.02
Departure from quadratic	4	7.29	24.82	1.82	NS
Error	280	747.11	2.66		
Total	286	769.93			

organization contributed to the uncertainty of its decisions. To examine this, each bank was characterized by measured volatility and diversity, and its decision uncertainty and processing were analyzed. The variables were dichotomized for analysis. The cutoff for volatility was based on the unstandardized regression used to define volatility; if b_i was greater than 1, the bank was classified as operating in a highly volatile environment, otherwise not. The cutoff for the diversity measure was determined by the factor scores computed for this measure, with zero as the cutoff.

An analysis of variance of the perceived uncertainty reported for each of the seven cases as a function of environmental characteristics of the banks was performed. The only significant effect was a main effect for volatility. The loan officers from banks in more volatile environments perceived more uncertainty across the decisions than did those from banks in less volatile environments. One reason for this result, however, may be the general tendency for banks from high-volatility environments to assign lower probabilities to cases than banks from low-volatility environments. Figure 3 plots the probability estimates made by loan officers from each type of environment.

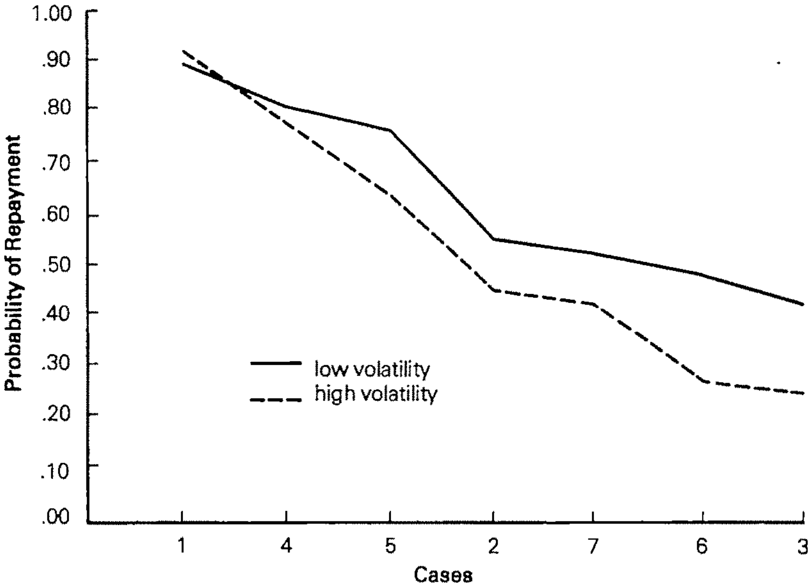

Figure 3. The effect of the environmental volatility on the perceived probabilities of repayment.

Note: *F* ratio for the multivariate test of equality of mean vectors is 2.3116, d.f.=7/31, $p < 0.05$.

A multivariate analysis of variance of these probability estimates indicated that environmental volatility appeared as a significant main effect, $F(1,31)=2.31$; $p < .05$. Low-volatility banks estimated higher probabilities for repayment of loans than other banks, a tendency which increased with the risk of the loan. Bank officers from highly volatile environments estimated probabilities as if poor credit risks were even less likely to repay the loan than they might have been. In a volatile environment, if only the information from a loan application were available to them, they would rather deny the loan than accept a high level of risk. Banks in more volatile environments were also more likely to reject the hypothetical loan applications than other banks.

Environmental Uncertainty and Information Gathered

Classifications of diversity and volatility were also analyzed in relation to the information that the banks normally collected and the additional information required to decide on the hypothetical loan applications. As expected, volatility was not related to the information routinely collected by loan departments for decision making. A count of the number of items of information requested on the loan application indicated no difference between banks from high- and low-volatility environments, with a mean of about 35 items. On the other hand, the diversity of a bank's environment had a significant influence on the number of items requested on the application form, with a mean of 37.50 for diverse or complex environments and a mean of 29.00 items for more homogeneous or simple environments. The mean difference is significant at $F(1,37)=12.97$. Moreover, the difference was not a result of the size of the bank, but remained after controlling for size in a regression analysis.

To examine the effect of environmental conditions on the use of information for the simulated decisions, a comparison was made between the cases with the most and the least decision entropy. An analysis of variance on the mean number of additional items of information which would be desired was computed for each case, and the results are reported in Table 4.

Table 4

Two-Way Analysis of Variance for the New Information Required for Decision Making in Cases 1 and 2

		Case 1 ($p=.91$)				Case 2 ($p=.50$)			
Source	df	Sum of Squares	Mean of Squares	*F*	*p*	Sum of Squares	Mean of Squares	*F*	*p*
Volatility	1	7.93	7.93	3.33	.07	.40	.40	.12	.72
Diversity	1	6.43	6.43	2.69	.10	.37	.37	.11	.73
Interaction	1	12.51	12.51	5.25	.02	.01	.01	.00	.94
Error	37	88.06	2.38			118.77	3.21		
Total	40	114.93				119.55			

Distribution of the Means

Environment			
Volatility	Diversity	Case 1	Case 2
L	L	1.25	2.62
L	H	1.46	2.46
H	L	2.09	2.81
H	H	1.00	2.57
$\bar{X}$		1.48	2.60

For Case 1, for which uncertainty was low, environmental volatility affected the requirements for additional information. Loan officers from banks in more volatile environments reported they would seek additional information to decide about a low-risk loan, compared to banks in a less volatile environment. For more uncertain decisions, however, banks from both environments required more information. In addition, a significant interaction effect indicated that bank officers requested more information primarily when the bank was in a volatile, but not diverse, environment.

The requests for information, it should be kept in mind, were in addition to requests in the application forms. The result is thus consistent with our expectation that environmental uncertainty will be reflected in the more permanent information systems of the banks when the source of that uncertainty is stable, such as community diversity, but will be evident in more idiosyncratic information gathering when the source of uncertainty is the volatility of the bank's economic environment, a condition which cannot be planned for.

Environmental Uncertainty and Decision Strategies

To examine how environmental conditions affected the decision strategies of loan departments, analyses similar to those for information gathering were performed. Loan officers' reports on the normal procedures used in making loan decisions were correlated with measures of volatility and diversity (Table 5).

Table 5

Intercorrelations Between Environmental Variables and the Structural Decision-Making Variables

Decision-making variables	Volatility		Diversity	
Number of hierarchical levels	.01	(.05)*	.31•	(.28)•
Amount of oral communication	.05	(.11)	−.15	(−.21)
Method of evaluating credit application	.22	(.15)	−.38••	(−.32)•
Amount of loan without higher authorization	.13	(.29)•	.05	(−.42)••
Specifications in bank loan policy	−.10	(−.11)	.50••	(.30)•

•$p < .05$; ••$p < .01$

*Values in parentheses are the partial correlations when organization size is controlled.

Consistent with expectations and with the findings for gathering information, the standard decision procedures used by the loan departments were associated more with differences in diversity than with differences in volatility. Banks from more diverse environments required more decision levels for loan approvals, used more formal and computational methods of credit application evaluation (formal ratings and computer processing), were more restrictive about the amounts that could be loaned without higher authorization, and had more specifications in their loan policies. By contrast, the volatility of the banks' environments was related only to the amount that might be granted without authorization, and then only weakly (after controlling for the size of the bank). Officers in banks from more volatile environments were authorized to grant larger amounts.

To examine the effect of environmental conditions on the handling of particular loan decisions, responses to the hypothetical decisions were analyzed (Table 6). Again, the most and least uncertain cases were compared; however, no strong effects for either case were observed as a function of diversity or volatility. The only notable effect was that for the uncertain case (Case 2): loan officers from banks in a volatile environment reported they would be more likely to seek the advice of their superiors and less likely to seek the advice of their colleagues in deciding on the case $F(1,37)=4.19$; $p < .05$.

Table 6

Two-Way Analysis of Variance for Decision Strategies Used in Case 1 and Case 2

		Case 1 (p=.91)				Case 2 (p=.50)			
Source	df	Sum of Squares	Mean of Squares	F	p	Sum of Squares	Mean of Squares	F	p
Volatility	1	.16	.16	.12	.72	4.19	4.19	4.09	0.05
Diversity	1	2.41	2.41	1.86	.18	.34	.34	.03	0.85
Interaction	1	.71	.71	.54	.46	1.38	1.38	1.35	0.25
Error	37	46.62	1.29			36.78	1.02		
Total	40	49.90				42.69			

Discussion

The results of this study of Illinois banks can be summarized around the hypotheses formulated. Both intuition and formal theory would indicate that uncertainty would be less when outcomes are very likely or very unlikely. Data from the loan officers were consistent with this: their disagreements about a case, estimated by standard deviations from the mean probability of each case, their perceived uncertainty about each case, and their need for additional information were all related to a quadratic function of the mean probability expected for repayment of a loan.

The environment of each bank was associated with both the experience of uncertainty and the response to it, although the picture was more complicated than expected from the literature. More volatile conditions led loan officers to estimate probabilities more conservatively and to seek additional information more than their counterparts in more stable economies. Diversity, however, was unrelated to the loan officer's perceptions of uncertainty and to their idiosyncratic requests for information. It was associated with the permanent organizational routines for handling loan applications, including the information requested on application forms and the formal procedures and specifications for making decisions.

For theorists who suggest that environmental conditions affect uncertainty and that uncertainty affects the structure and operation of organizations, the results of this study are more complicated. For critics (Tosi, Aldag, and Storey, 1973; Downey, Hellriegel, and Slocum, 1975; Pfeffer, 1977) who have suggested that uncertainty is poorly articulated and elusive, these results also only partially support their position. The problem lies in a failure to be precise about uncertainty and its specific implications for an organization. When the dimensions of environmental uncertainty are combined with the cause-effect dimension of the decision situation, a limited but precise definition of uncertainty is developed for a given decision situation. Based on this definition, the implications of uncertainty for an organization can be stated as the logarithm of the variance of a distribution of probabilities across an event or outcome space coupled with environmental volatility. And in general, to the extent that uncertainty is relevant to an organization's functioning at all, it is reduced by information. Thus, in general, organizational decision systems will be structured to reduce the uncertainty inherent in its decisions.

The above general statements, however, specify nothing about the particular empirical consequences to be expected in a given organizational context. For this, one needs to speculate about the particular decisions of an organization, how uncertainty may arise and how information, and the structures developed to collect it or process it, may reduce it. For the case of the loan departments of county banks discussed in this paper, such speculation led to the following expectation. Both the volatility and the diversity of the environment in an organization can create uncertainty, but the organization is not equally able to respond to each and should not be expected to be equally associated to the functioning of the organization. Volatility is, by definition, unpredictable change and to expect it to affect permanent structures (other than to promote the development of flexible and potentially changeable structures) would seem to be at variance with the meaning of the term. When it creates uncertainty, coping with it would be outside the normal procedures of an organization, as it was in the banks studied here.

This conclusion accords with Thompson and Tuden's (1959) decision strategies. Their model also concludes that when the uncertainty about beliefs about causation is high, even though the preferences are clearly known and shared, the organization must rely on judgment rather than specific structural arrangement to reduce uncertainty. Because neither the information collected from the environment nor the computations performed within the organization can provide indisputable and complete evidence, only the collective judgment can determine the decision.

In this study, organizational preferences, another source of decision uncertainty, were intentionally excluded. From an epistomological point of view (Morgan and Smircich, 1980), this exclusion made it possible to develop a precise and content-specific definition of uncertainty. The next interesting question that requires attention is how to address the issue of uncertainty associated with preferences and its implication for organization structure and decision making. This necessitates a new research orientation, in which reality is defined as a social construct and political processes within the organization are integrated with environmental variables.

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APPENDIX

Case 1:

Your customer is a middle aged, well-dressed man. After a very friendly conversation with you, he filled out the application form for a personal loan. The information concerning the client is presented below.

Name: A. K. Jones
Sex: Male *Age:* 42 *Marital status:* Married
Residence: Owns home in a suburb near the city
Bank account: Savings _X_ Checking _X_
Time at present residence: 10 years
Telephone: Yes _X_ No____
Occupation: Dentist
Time in present job: 10 years
Number of dependents: 4
Monthly income: $ 1800.00
Purpose of the loan: purchase automobile
Amount of loan: $ 7000.00, payment by equal installments for two years.

a. What is the probability that the loan applicant will pay back his debt in this case?

lowest 0% 10 20 30 40 50 60 70 80 90 100% *highest*

b. How sure are you about the above probability?

very certain 1 2 3 4 5 6 7 very uncertain

c. If you are not completely satisfied with the above information to make a sound decision, what other information do you need (other than the information requested in your application form)?

1-
2-
3-
4-
5-
6-

d. Before you make a decision on this loan application which of the following actions would you take? (check one)

____ You would rather talk to your colleagues in your department about this loan.

____ You would actively seek the advice of your colleagues.

____ You would seek the advice of your superiors.

e. Do you have to get the authorization of your superiors or a committee in this case?

yes____ ? ____ no____

f. If yes, from whom?

____ Senior officers loan committee
____ Directors loan committee
____ Executive committee
____ President
____ Board of directors
____ Others (please specify)

g. How much interest do you think it is necessary to charge in this case?____ %

h. If you had only the above information about this loan application, do you accept or reject it?

accept____ reject____

The Commitment and Job Tenure of New Employees: Some Evidence of Postdecisional Justification

Charles A. O'Reilly, III
and David F. Caldwell

The effects of postdecisional justifications on the job satisfaction and commitment of new employees were investigated. One hundred and eight M.B.A.'s were questioned about their job choice immediately after making the decision and then again six months later. Turnover data were collected after 24 months. Results showed that individuals who had made the original decision volitionally, that is, from among a number of offers and free from external constraints, and who had perceived the choice to be irrevocable were more satisfied and committed six months later than others. The perceived irrevocability of the choice and behavioral commitment were also negatively related to turnover after two years. Interaction effects between the sufficiency of the original justification and job alternatives was associated with diminished job satisfaction and commitment for insufficiently justified respondents. Overall, the results of this investigation are interpreted as consistent with the view that attitudes and commitment may be created retrospectively through processes of rationalization and justification.•

For a number of years researchers have been interested in how individuals choose jobs. Some of this interest has been generated by the observation that turnover during the first year of employment is often very high, especially among recent college graduates (Wanous, 1977). A number of explanations for this high turnover rate have been offered. It has been proposed, for instance, that individuals leave jobs because their initial expectations about the job were not fulfilled (Dunnette, Arvey, and Banas, 1973), because they were inadequately socialized by the organization (Van Maanen, 1976), or because they lacked commitment to the organization (Buchanan, 1974; Mowday, Steers, and Porter, 1979). The basic premise underlying these explanations is that a failure either on the part of the individual or on the part of organization has occurred. This view of commitment and turnover may be characterized as one that relies on prospective rationality; that is, success or failure is a function of the accuracy of the individual in assessing the job choice and of the ability of the organization to select and socialize the new employee (Price, 1977; Feldman and Arnold, 1978).

As Staw (1980) has recently noted, however, a complement to rationality in decision making is self-justification. Once a choice has been made, the behavioral act may serve as a constraining reality that can shape future attitudes and behavior. Thus, an alternative explanation for satisfaction and turnover among new employees may be seen in processes of commitment and self-justification (Kiesler, 1971; Salancik, 1977; Pfeffer and Lawler, 1980). In addition to prospectively rational processes, in which an individual's attitudes lead to subsequent behavior, people may also engage in retrospective processes of self-justification, with behavior serving to shape future actions and attitudes. The purpose of this article is to report the results of a series of tests of predictions of job satisfaction, organizational commitment, and turnover, based on the process of initial commitment and self-justification.

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PROSPECTIVE AND RETROSPECTIVE RATIONALITY

The difference between these two approaches (prospective and retrospective) to organizational commitment was best illustrated by Salancik (1977). In the prospective view, commitment is conceived of as an individual's psychological bond to the organization, typically a function of job involvement, loyalty, and a belief in the values of the organization (Buchanan, 1974; Mowday, Steers, and Porter, 1979). Subsequent work attitudes and behavior are seen as a function of met expectations and of objective characteristics of the organization, job, and individual (Price, 1977; Mobley et al., 1979; Louis, 1980).

The prospectively rational view appears to rely on two premises: (1) the choice process is based on a search for and use of information that allows the decision maker to form rational expectations about how good or bad the alternatives are likely to be, and (2) objective differences exist among organizations, jobs, and individuals, which may account for subsequent variations in satisfaction and commitment. The first premise is often discussed in terms of the unrealistic expectations of recruits that result from inadequate or poor information, so that the individual makes a choice that is inferior or that results in unmet expectations (Wanous, 1977; Louis, 1980).

In discussing the second premise, researchers offer three primary explanations for variations in job satisfaction and commitment. First, individuals may differ in such a way that more qualified applicants are also more likely to receive more job offers and higher salaries. Second, it may be that jobs accepted by those with more offers are objectively better. Third, it may be that some individuals are treated better by their employers (salary increases, more responsibility). The difference in treatment may then explain variations in work attitudes and commitment. As Salancik (1977) pointed out, a difficulty with this conceptualization is that it is useful only after the fact; that is, one can categorize people as committed or uncommitted, but one cannot say much about how individuals become committed.

In the alternative view, commitment results retrospectively as individuals become bound to behavioral acts; hence, drawing on Kiesler and Sakamura (1966), Salancik defined commitment as "the binding of the individual to behavioral acts" (1977: 4). This conceptualization of behavioral commitment is predicated on earlier social-psychological studies of dissonance (Festinger, 1957), cognitive consistency (Gerard, 1968), and self-justification (Kiesler, 1971). Its basic assumptions are (1) that individuals attempt to resolve inconsistencies between behaviors they perform and attitudes they hold and (2) that the effect of commitment is to make an act or behavior less changeable, so that people tend to continue acting in ways consistent with previous behaviors. The notion is that voluntary behavior, that is, behavior that cannot be justified by extrinsic causes such as pay or coercion, will result in individuals' retrospectively interpreting the behavior in positive terms and being more committed to the course of action than will behaviors justified by extrinsic causes.

A substantial body of research has demonstrated that the free choice of a course of action results in greater persistence, increased satisfaction, and a propensity to choose information that justifies the actions. For instance, Comer and Laird (1975) designed an experiment that allowed students to choose whether or not to participate in a study. Students were warned that the experiment was "unpleasant." Circumstances were manipulated so that most students "freely chose" to participate. Given time to think, and stuck with their choice, many subjects subsequently chose to eat a worm and to report that it tasted good. Similar experiments have demonstrated that when induced to make some initial voluntary compliance, people are more likely to become bone marrow donors (Schwartz, 1970), to pay more for an automobile than planned (Cialdini et al., 1978), to assist in political campaigns (Kiesler et al., 1971), and to escalate their efforts on behalf of clearly failing endeavors (Staw and Fox, 1977) than if compliance is not voluntary. These studies have also shown that, in general, any characteristic of a person's choice or situation that reduces felt responsibility will also reduce commitment and satisfaction. So, when choices are made or tasks are performed for instrumental reasons, individuals typically express less satisfaction and are less willing to continue with the actions (Calder and Staw, 1975; Ross, 1975). Zanna (1970), for example, conducted an experiment in which students worked either for a nice or a nasty supervisor and worked either faster or slower than a confederate. Those who worked very fast for a nasty boss enjoyed the task more than other subjects. The explanation of these results rested on the cognitive reevaluation that subjects appeared to have made of their actions; that is, it was more reasonable to conclude that "if I worked hard (fast) for a nasty supervisor, I must have enjoyed the task" than to conclude that "I worked fast because I liked the nasty boss." Postaction justification of this type is likely to occur when the original behavior is seen by the actor as voluntary and cannot be justified by extrinsic causes.

The results of these and other studies (e.g., Deci, 1975; Pritchard, Campbell, and Campbell, 1977; Harackiewicz, 1979; Caldwell and O'Reilly, 1982a) are relevant in two important ways for studies of job choice. Pfeffer and Lawler (1980) observed (1) that behavioral commitment derived from a lack of sufficient extrinsic justifications may have a direct impact on subsequent attitudes and (2) that behavioral commitment may combine with salient extrinsic justifications to intensify subsequent attitudes. In the former instance, job-choice decisions made for intrinsic, as opposed to extrinsic, reasons may result in more positive attitudes toward the work. In the latter case, the original justifications for the job choice may interact with subsequent opportunities to change the original decision, such as a new job alternative, or to interpret new justifications for the choice, such as a pay raise or transfer.

HYPOTHESES

Job Choice as a Determinant of Behavioral Commitment

The manner in which the job choice decision is made may affect the decision maker's subsequent satisfaction and behavioral commitment. In his review of commitment, Salancik (1977) noted that not all behaviors are equally committing. Rather, the degree of commitment, or binding, of subsequent attitudes and behaviors to a preceding action is contingent upon characteristics of the behavioral acts that make them binding. These characteristics relate directly to the extent to which the actor may perceive the original behavior as stemming from intrinsic or extrinsic causes, and they form the bases for the hypotheses to be investigated in this study.

The first determining characteristic of subsequent commitment is the extent to which the original act is explicit; that is, a behavior leads to greater subsequent commitment when the action taken is unequivocal. In choosing a job, for example, individuals who are required to sign a formal contract or who are explicitly expected by the company to remain for a specified time are likely to feel more satisfied and committed than those for whom the decision is less explicit.

Hypothesis 1: The degree to which a job choice is made explicit will be positively related to future job satisfaction and commitment.

A second determining characteristic of commitment mentioned by Salancik (1977) is the irrevocability, or irreversibility, of the action. The more reversible a choice is, the less committed an individual is likely to be to that course. When an individual decides to accept a job and feels that the choice is irrevocable, that is, that it would be quite difficult to change jobs easily, postaction justification is likely to increase feelings of satisfaction and commitment. Job choices that are easily changed allow the decision maker to reduce his or her behavioral commitment to the choice. Reality in the former case is more indelible, less changeable, and more likely to be justified in positive terms.

Hypothesis 2: The degree to which a job choice is irrevocable will be positively related to future job satisfaction and commitment.

Another characteristic that affects subsequent commitment is volition, or the extent to which the decision maker perceives the choice to have been made voluntarily and to be free of constraints. When a choice is made to satisfy the demands of others or for extrinsic reasons, one's feelings of personal responsibility for the outcomes may be diminished. Many studies of intrinsic motivation have shown that a feeling of self-determination is associated both with increased satisfaction and with task persistence (e.g., Steiner, 1970; Zuckerman et al., 1978; Guzzo, 1979; Mossholder, 1980). Similarly, if one has little choice, such as having only one or two job offers, future commitment is likely to be less than if the choice is made from among many offers. In the former case, postaction justification is likely to include an awareness that the choice was constrained, whereas in the latter case, justification will include an appreciation that many alternatives existed; therefore, personal responsibility for the choice is higher.

Hypothesis 3: The degree to which a job choice is made voluntarily (free from external constraints) will be positively related to future job satisfaction and commitment.

A final characteristic affecting commitment is publicity, or the degree to which the action is visible to significant others such as colleagues, friends, and family. When a choice is made publicly, so that important others are aware of the decision, responsibility for the choice is linked more closely to the decision maker. Under these circumstances, it is more diifficult for the actor subsequently to deny responsibility for the consequences of the choice. Postaction justification is likely to result in more intrinsic and positive attributions. Conversely, if a choice is made but not made public, it is far easier for the decision maker to ignore personal responsibility at a future date and to justify the choice on extrinsic bases. Therefore, when individuals are making a job choice, it is expected that those who are more open in telling others details of their choice will also be more committed and satisfied at a later date than those who do not discuss their choice with others.

Hypothesis 4: The degree to which a job choice is made publicly will be positively related to future job satisfaction and commitment.

The Salience of Justifications and Continued Commitment to a Job Choice

Numerous studies have demonstrated that providing extrinsic rewards for task performance may reduce the intrinsic motivation to perform the task in the future. These studies generally show that when it is made salient to a person that there are instrumental justifications for their behavior, less positive attitudes toward the task may result (Condry, 1977; Folger, Rosenfield and Hays, 1978; Harackiewicz, 1979). Pfeffer and Lawler (1980: 309) observed that the "basic prediction of dissonance theory (Festinger, 1964) is an interaction between the sufficiency of justification for engaging in an activity, commitment to the activity, and subsequent attitudes." Staw (1976) suggested that justification effects are most likely to occur when the task is interesting, when no norm exists legitimating extrinsic rewards, and when the reward is made salient. Thus, the ultimate impact of making salient the opportunity for extrinsic justifications depends on the initial commitment of the person to the course of action and on the manner in which the extrinsic reward is presented (Harackiewicz, 1979; Rosenfield, Folger, and Adelman, 1980). In the context of choosing jobs, we have hypothesized that subjects who have several job offers and who accept a job at a salary below the highest offered should have less extrinsic justification for their choice than those who either have only a single offer or who accept the top offer. When individuals who have fewer extrinsic justifications for their choice are made aware of this insufficient justification one might predict that their commitment to the job would be higher (O'Reilly and Caldwell, 1980). For subjects who possess sufficient extrinsic justifications for their choice, making salient the reasons for their decision should result in less commitment (Folger, Rosenfield, and Hays, 1978; Rosenfield, Folger, and Adelman, 1980).

The original justification for the job choice can be made salient in several ways. For instance, we may imagine two groups of employees, one of which accepted jobs at salaries below the highest offered and one which accepted the highest offers. Members of the first group are predicted to have fewer extrinsic reasons for their job choice and, therefore, to be more committed to it, whereas members of the second group are likely to have more extrinsic justifications and lower commitment. Suppose that, after several months on the job, a number of these employees are approached by other firms with job offers. Some predictions might be made about the effect of these offers on the employees' original attitudes and commitment. A prospect of another job at a higher salary is unlikely to affect the attitudes of those individuals who took a job at the highest salary offer, since they already have a sufficient extrinsic justification for their choice, and the difference in salary levels may not be highly salient (Taylor and Fiske, 1978). Individuals who accepted offers at lower salaries and who do not receive job offers are also likely to remain satisfied and committed, as predicted by the idea of insufficient justification. The attitudes, however, of those persons who had accepted lower paying jobs and who are then offered new job alternatives are likely to be negatively affected, since initial choice suddenly ceases to be irrevocable, and the salary difference is more salient. As Taylor and Fiske (1978) noted, attention is selective and drawn to novel or major differences. For insufficiently justified employees, it may be that a major component of a new job alternative is the salary. If this is the case, these individuals may then lower their commitment as they consider accepting a new job for extrinsic reasons. This suggests the following hypothesis:

Hypothesis 5: The sufficiency of the original justification for accepting the job and the saliency of this justification will interact in such a way that individuals who accepted a job at a lower salary than available who subsequently receive a serious inquiry for another job will be less satisfied and committed than either individuals who accepted the highest salary offered or those who accepted low salaries but do not have the new job alternatives.

Another way in which the sufficiency of the original justification may be made salient is to require individuals to review their reasons for accepting the position. If, for example, the two types of employees (those who accepted an offer at less than the highest salary available and those who took the top offer) are provided with information about salaries accepted by similar others, the salience of their choice may be heightened. If these individuals are then asked to recall how much of a sacrifice they had to make to accept their current position, those who accepted lower offers and who had to sacrifice much should be more positive about their jobs than those who sacrificed less. Conversely, subjects who accepted a high offer at little sacrifice should experience less conflict and be more committed than those who sacrificed much to take a job at the highest offer. Folger, Rosenfield, and Hays (1978), for example, found that choice and pay interacted in such a way that high intrinsic motivation occurred under conditions of high choice and low pay and low choice and high pay. Low intrinsic motivation resulted when low pay was accompanied by low choice or high pay by high choice. Sacrificing to take a job is consistent with accepting a job at a low salary, and a lack of sacrifice is consistent with accepting the highest offer. This suggests the following hypothesis:

Hypothesis 6: The sufficiency of the justification for accepting a job and the sacrifice required will interact in such a way that individuals who initially accepted a job at a lower salary than available, who also had to sacrifice much to take the job, and individuals who accepted the highest offer and did not have to sacrifice will be more satisfied and committed than those who either took a lower offer without sacrifice or who accepted a higher offer at a sacrifice.

The hypotheses postulated are derived from theories of retrospective rationality (Salancik, 1977; Staw, 1980). It may be, however, that individuals with greater choice (e.g., more job offers) are also likely to receive "better" job offers. It may be that more capable individuals will be recognized by employers and treated accordingly, resulting in more favorable attitudes and intentions on the part of the employee. Thus, in order to investigate the theories of retrospective rationality, it is necessary to eliminate or control for explanations based on theories of prospective rationality.

In order to eliminate the possibility of these effects, it should be demonstrated that the job choices made by subjects do not differ in the accuracy and availability of information, nor do subjects differ in their met expectations after taking jobs. If, for example, subjects who had less choice also evinced greater unmet expectations in their job, one could not conclude that any differences in subsequent commitment were due either to prospective or to retrospective rationality. Either or both could account for such findings. Similarly, it should be demonstrated that no significant differences exist between high- and low-choice or high- and low-salaried subjects in their reasons for accepting a particular position.

It should also be demonstrated that no significant objective differences exist among individuals, jobs, and organizations. Although some evidence is available suggesting that recruiters do not appear to select applicants on the basis of grades (Pfeffer, 1977), it may be that individuals with more experience or certain majors attract more job offers. It is difficult to demonstrate conclusively that jobs are or are not objectively different. As Salancik and Pfeffer (1978: 249) have persuasively argued, "workers possess the ability to construct their own satisfaction by selectively perceiving and interpreting their social environment and their own past actions." Using a social information-processing perspective, it is difficult to identify what objective differences might account for variations in attitudes and commitment. Although it is difficult to rule out conclusively all possible alternative explanations of this type before a retrospectively rational explanation of commitment can be seriously considered, some comparability must be demonstrated across subjects and jobs.

METHODS

Procedure

A survey was conducted of all spring graduates of an M.B.A. program at a state university. A total of 171 graduates received questionnaires two weeks before the end of the academic year (Time 1). One hundred and eight completed questionnaires were returned, for a response rate of 63 percent. Six months later (Time 2) those 108 respondents were again surveyed to assess their job satisfaction and commitment. One hundred and one of the 108 subjects responded to this second survey, a response rate of over 93 percent. Twenty-four months after the initial survey (Time 3), 97 of the original 108 subjects (a response rate of almost 90 percent) were contacted to determine whether they had changed firms.

Subjects

All respondents had been full-time students in a two-year M.B.A. program. The mean age of the respondents was 26.4 years, and the mean number of years of previous full-time work experience was 3.1. Individuals averaged over three job offers. Average time on the job at the time of the second survey was six months.

Independent Variables

Because the purpose of this investigation was to test the impact of job choice on subsequent satisfaction and commitment, a series of responses to questions descriptive of the job choice decision process were obtained at Time 1 and were used to predict job attitudes and tenure intentions at Time 2 and turnover at Time 3. Four aspects of the job choice process were assessed: explicitness, perceived revocability, volitionality, and publicity of the decision.

Explicitness was assessed in two ways. Respondents indicated whether, as part of their job acceptance, they were required to sign a formal contract. Subjects also indicated whether there was an explicit expectation on the part of the company that they would remain with the firm for at least some minimum period of time. Since these two questions were not significantly correlated ($r = -.06$), both items were retained in subsequent analyses rather than being summed to form an index.

Irrevocability was measured by asking respondents two questions using seven-point scales. First, subjects were asked how difficult it would be to change jobs should they decide to do so, and second, relative to other new M.B.A.'s, how easy it would be for them to change jobs if they wanted to. Since these two questions were correlated ($r = .39$, $p < .001$), they were combined to form an index of irrevocability and scored so that a high score represented high perceived irrevocability.

Volitionality, according to Salancik (1977), consists of four dimensions. A measure of each was obtained as follows: (1) *choice* was assessed as the number of actual job offers among which the respondents had to choose; (2) the *presence of external demands for action* was measured by asking the subjects to indicate, on a seven-point scale, the extent to which the decision was based on external pressures (e.g., finances); (3) the presence of *extrinsic bases for action* was assessed by asking the respondents, on a seven-point scale, the extent to which the job choice was based on their own feelings about the job (high score equals high volition); and (4) the *presence of other contributors to action* was tapped by asking subjects to indicate, on a seven-point scale, the extent to which they based the job choice on satisfying the needs of others, such as family and friends. Because all variables were thought to measure a single underlying construct, a principal component analysis with a varimax rotation was performed and revealed a single underlying factor. These four measures were summed to form an index of volitionality scored so that a high score represented increased volitionality. Cronbach alpha for the index was $\alpha = .57$.

Publicity refers to the extent to which important others know of the action. This was assessed by responses to two questions asking how open the respondent had been in telling others about the new job and the percentage of family and friends to whom the respondent had spoken at length about the job choice. Both questions used seven-point scales and correlated $r = .47$ ($p < .001$); hence, they were summed to form an index scored so that a high score indicated increased publicity for the decision.

Dependent Variables

Two categories of dependent measures were assessed at Time 2, job satisfaction and commitment. Satisfaction refers to an overall affective orientation to a job, whereas commitment refers to attachment to the organization. Two measures of job satisfaction were obtained. Participants indicated, on seven-point scales, how satisfied they were, overall, with their job and the extent to which they would prefer another, more ideal job. The correlation between these two items was $r = .66$ ($p < .001$). These two items were summed to form a satisfaction index, with a high score indicating high satisfaction. Three assessments of commitment were obtained. Attitudinal commitment was assessed using the 15-item index developed by Mowday, Steers, and Porter (1979). Respondents indicated, on seven-point scales, the extent to which they agreed or disagreed with statements assessing perceptions of loyalty to the organization, willingness to exert effort to achieve organizational goals, and acceptance of the values of the organization. Cronbach alpha for this measure was $\alpha=.89$. In addition to attitudinal commitment, two measures of tenure intention, or behavioral commitment were also obtained. Respondents indicated, on a five-point scale, the likelihood of their working for the organization in three years (Kraut, 1975) and also provided an estimate, on a seven-point scale ranging from less than one year to more than ten years, of how long they planned to remain with the organization.' Since the correlation between these two items was $r = .81$ ($p < .001$), they were summed to form an index of tenure intention or behavioral commitment.

Turnover at Time 3 was assessed initially through a survey that asked respondents to return a self-addressed envelope indicating whether they were still working for the same firm selected upon completion of the M.B.A. program. Sixty-six responses were obtained. Phone calls were then made to the firms of the remaining 42 subjects, and employment verification was obtained for 31 additional respondents. Results showed 66 stayers and 31 leavers (a turnover rate of approximately 32 percent for the Time 3 sample). To test the independent contribution of job-choice variables on subsequent satisfaction, commitment, and turnover, four regressions were computed using the commitment measures, job satisfaction, and turnover as dependent variables.

Moderator Variables

To test the interaction of initial commitment and the saliency of the original justifications, two other questions were asked at Time 2. First, individuals were asked if they had received a serious inquiry about accepting another job ("Have you either had another job offer or a serious inquiry about another job since beginning work?") Thirty-eight percent of the respondents had received such an inquiry. Second, to make salient the original justifications for accepting the job, a question was also asked that required respondents to recall how much they had had to sacrifice to accept their job ("How much did you have to give up in order to take this job, e.g., other jobs which were quite attractive, preferred location, higher salary, etc.?")

For hypotheses 5 and 6, the sufficiency of the initial justification for accepting the job was operationalized as follows: first, only those subjects who had received more than one job offer were selected for analysis. Seventy-seven respondents were included, while 28 who had received only one formal offer were excluded. Second, subjects who had accepted a job offer at less than the highest salary (collected at Time 1) were identified as having an insufficient justification for the job choice. Third, subjects who had accepted the highest salary offered were identified as having a sufficient justification for the job choice. To test the interaction of salary accepted and the availability of job alternatives at Time 2 (hypothesis 5), two-way analyses of variance were computed and the interaction effects examined.

To test the interaction between salary accepted and the sacrifice required to take the job postulated in hypothesis 6, moderated multiple regressions with an interaction term between a nominal and a quantitative variable were computed (Cohen and Cohen, 1975). The computed interaction terms created in this approach are likely to be correlated with the variables from which they were created. To reduce this multicollinearity, Althauser (1971) recommended subtracting off the mean of each of the independent variables before computing the product term. This transformation does not affect the correlations among the variables and permits a better estimate to be made of the contribution to explained variance of the product term. This procedure was followed.

Control Variables

In order to assess the likelihood that findings resulted from unmet expectations about the job or more objective differences in individuals, organizations, or jobs, data were also collected that would allow comparisons to be made across subjects and jobs. Tests between high- and low-choice subsamples were performed for the set of variables below. It should be noted that this set of control variables is not complete and that other job-related factors may affect satisfaction and commitment, for example, task characteristics.

Unmet expectations were assessed in three ways. First, to determine if respondents had access to information about the job they chose, three questions were asked at Time 2 about how accurate the information that they had received during recruiting was, compared to their actual experience in terms of "the work you would actually be doing," "working conditions," and "responsibility in the job." These three items were highly intercorrelated (median $r = .60$) and summed to form an index representing the accuracy of information (Cronbach $\alpha = .84$) Second, to assess the extent to which their expectations had not been fulfilled, respondents were asked at Time 2 "To what extent have your initial expectations been met regarding what the job would be like?" Subjects were also asked, in an open-ended format, "Since beginning work have there been any major unanticipated surprises for you in your job?" Responses were coded dichotomously as yes or no. Finally, to assess reasons for choosing a job, subjects were asked at Time 1 the degree to which they were "excited" about the following aspects of their job: responsibility, opportunity to learn, advancement, location, salary, and coworkers. Subjects were also asked "Overall, how satisfied are you with your job choice?" Responses to these questions were on seven-point scales.

Variations in individuals, jobs, and organizations were assessed in several ways. First, the respondents provided information about their M.B.A. concentration, years of previous full-time work experience, age, and marital status. The information obtained about the job and the treatment they received included whether or not they had received a salary increase, how closely they were supervised (a seven-point scale), and the geographic location of the job.

RESULTS

Main Effects

Means, standard deviations, and correlations among the variables are presented in Table 1. Associations among the independent variables and the moderator variables used to test hypotheses 5 and 6 were low, so that multicollinearity does not appear to have been a problem. A number of the relationships among the independent and moderator variables were interpretable. For instance, accepting a job at the highest wage offered was negatively correlated with the perceived sacrifice associated with accepting the job ($r = -.28$, $p < .01$). Viewing the job choice as irrevocable at Time 1 was inversely related ($r = -.18$, $p > .05$) at Time 2 to the availability of other jobs, suggesting that there is some validity to the measure of irrevocability. Associations among the independent variables showed the volitionality of the decision to be positively related to revocability. The magnitudes of these correlations were, however, not great. Correlations among behavioral and attudinal commitment and job satisfaction were high, although some available evidence demonstrates that while related, there are differences in the the three constructs (Mowday and McDade, 1979; O'Reilly and Caldwell, 1980).

The correlations in Table 1 generally support hypotheses 2 and 3. The volitionality of the initial job-choice decision was significantly related to commitment and satisfaction with the job six months later. The irrevocability of the decision was also significantly correlated with behavioral commitment and job satisfaction, as well as with turnover two years later. Neither

Table 1

Means, Standard Deviations, and Correlations among the Variables (N=108)

Variables	X	S.D.	1	2	3	4	5	6	7	8	9	10	11
Independent variables													
1. Volition	19.9	4.2											
2. Publicity	11.3	3.6	.18•										
3. Irrevocability	6.50	2.8	–.27••	.01									
4. Explicitness — formal contract (1=yes, 2=no)	1.85	0.36	.02	.06	.07								
5. Explicitness — employer expectations	1.82	0.38	.25••	–.01	–.14	–.06							
Moderator variables													
6. Salary accepted (1=low, 2=high)	1.56	0.50	–.05	–.06	–.02	.22••	.12						
7. Sacrifice necessary to accept job	3.47	1.89	.13	.08	–.02	–.06	–.09	–.28••					
8. Job alternatives (1=no inquiry, 2=serious inquiry)	1.38	0.49	–.12	–.09	–.18•	–.08	–.04	–.03	–.11				
Dependent variables													
9. Behavioral commitment	7.16	2.58	.17•	.13	.27••	.08	–.02	.08	–.01	–.30••			
10. Attitudinal commitment	73.9	14.7	.22••	.12	.16	.15	.02	.12	.08	–.26••	.69••		
11. Job satisfaction	9.97	3.18	.27••	.01	.18•	.01	–.05	.02	.02	–.20•	.67••	.70••	
12. Turnover (1=stay, 2=leave)	1.32	0.47	.11	.15	–.19•	.03	.10	–.08	.02	.17	–.50••	–.35••	–.32••

•p <.05; •p <.01

Table 2

Regression Results

Independent Variables	Dependent Variables							
	Behavioral commitment		Attitudinal commitment		Job satisfaction		Turnover	
	r	*β*	*r*	*β*	*r*	*β*	*r*	*β*
Volition	.17••	.25••	.22•••	.27•••	.27•••	.38•••	.11	.01
Publicity	.13	.08	.12	.06	.01	–.06	.15	.15
Irrevocability	.27•••	.33•••	.16	.23••	.18••	.27•••	–.19••	–.19•
Explicitness—formal contract	.08	.04	.15	.13	.01	–.02	.03	.04
Explicitness—employer expectations	–.02	–.03	.02	–.01	–.05	–.11	.10	.07
R^2	.15		.12		.17		.07	
F-ratio	3.09•••		2.47••		3.28•••		1.27	

•*p* <.10; ••*p* <.05; •••*p* <.01

the explicitness of the decision nor its publicity was associated with the outcome variables.

The results of the regression equations are presented in Table 2 and generally support hypotheses 2 and 3.[1] The three equations with dependent variables measured at Time 2 were significant; that is, the manner in which the original job choice was made was a significant predictor of commitment and satisfaction six months later. The results basically restate those shown in Table 1. As postulated in hypotheses 2 and 3, both the volitionality and the irrevocability of the job choice were significantly related to subsequent satisfaction and commitment. When an individual chose a job in such a way that perceived volition was high, future satisfaction and commitment were higher than when volitionality was low. Similarly, when the job choice was made in such a way that the decision was perceived to be more irrevocable (perceived difficulty in obtaining a different job should the chosen one prove to be unacceptable), subsequent satisfaction and commitment were also stronger than when the decision was perceived to be revocable. Turnover two years later was not strongly related to how the job choice was made. There is some evidence, however, that the perceived irrevocability of the initial decision was weakly related to subsequent tenure. The results in both Tables 1 and 2 show no evidence to support hypotheses 1 and 4. Neither the explicitness of the decision nor its publicity were predictive of satisfaction and commitment.

The results in Tables 1 and 2 suggest that volitionality and irrevocability are reasonable predictors of commitment and satisfaction at Time 2. The correlations between turnover and the Time 2 variables (Table 1) suggest that commitment and satisfaction at Time 2 may be good predictors of turnover at Time 3. Behavioral commitment, for instance, was strongly correlated with turnover up to 18 months later ($r = -.50$, $p < .01$). Attitudinal commitment and job satisfaction were also significantly related to subsequent turnover ($r = -.35$, $r = -.32$, $p < .01$). It should be noted that these are correlations between attitudes and intentions and behavior up to a year and a half later. To test this further, a regression of turnover on the satisfaction and commitment variables was performed. The equation was significant ($F = 9.90, p < .001, R^2 = .26$), with only behavioral commitment contributing signifcantly ($\beta = -.52, p < .001$). Overall, the results of tests of hypotheses 1 through 4 suggest that two aspects of the decision process, volitionality and irrevocability, lead to subsequent satisfaction and commitment. Behavioral commitment is, in turn, related to future tenure.

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[1] The use of a bivariate dependent variable in a multiple regression is equivalent to a two-group discriminant function analysis. Although the standardized regression coefficients are equivalent, interpretation of significance levels attached to the betas from the regression with a dichotomous dependent variable may be distorted. For this reason, the size of the standardized coefficients is of primary interest when interpreting the results. See Kmenta (1971: 428–451), for a discussion of this issue.

Interaction Effects

Hypotheses 5 and 6 postulated that there would be significant effects on commitment and satisfaction from the interactions of the sufficiency of the original justification for accepting the job and the saliency of these justifications after the respondents began working. The interactions between salary accepted and the availability of job alternatives for behavioral commitment ($F = 10.6, p < .01$), attitudinal commitment ($F = 10.0, p < .01$), and job satisfaction ($F = 4.6, p < .05$) were significant; that is, the sufficiency of the initial justification and the availability of alternative jobs exerted a joint impact on attitudes and commitment. For each of the three dependent variables, the impact was similar. Respondents who had accepted job offers at less than the top salary (insufficient justification condition) and who had not received any serious inquiries about alternative jobs evinced the highest levels of satisfaction and commitment. When insufficiently justified subjects received inquiries about other jobs, their levels of satisfaction and commitment were lowered. Individuals who had chosen the highest paying position showed intermediate levels of commitment and satisfaction and appeared unaffected by the possibility of alternative jobs. No significant main effects were found for salary, but significant effects were present for job alternatives. Individuals receiving another job offer were less satisfied and committed than individuals with no other job offers. These findings support hypothesis 5.

The interaction between the salary accepted and the sacrifice required to take the job was significant for behavioral commitment ($F = 7.27, p < .01, R^2 = .07$) and for attitudinal commitment ($F = 5.37, p < .02, R^2 < .05$) but not for job satisfaction ($F = 0.0$, n.s.). The significant interactions support hypothesis 6 and show that individuals remained most committed either if they accepted a high salary with little personal sacrifice of if they accepted a low salary with substantial personal sacrifice. Low commitment occurred in the obverse conditions. These results are consistent with the notions of postaction justification (Folger, Rosenfield, and Hays, 1978).

Control Variables

Although these results generally support the retrospective hypotheses the prospectively rational approach offers an alternative explanation for the findings. As suggested earlier, lower commitment and satisfaction and higher turnover may result either from unmet expectations or from variations in the nature of individuals, jobs, and organizations. In order to accept the retrospective interpretation, one must attempt to rule out these alternative explanations. Some evidence of this sort is available in comparisons between individuals who received only one offer and those who received more than one, and between individuals who accepted the highest salary offered and those

Table 3

Comparison of Means for Subjects' Expectations and Objective Differences in Demographics, Jobs, and Organizations

Variable	Job Offers			Salary Accepted•		
	One	More than one	statistic	Less than top salary	Highest offered	statistic
Unmet expectations						
Accuracy of information	12.7	14.6	n.s.	14.9	14.7	n.s.
Initial expectations met	4.2	4.4	n.s.	4.2	4.5	n.s.
Major unanticipated surprises (1=no; 2=yes)	1.8	1.5	2.77••	1.5	1.5	n.s.
Reasons for accepting job						
Responsibility	5.6	5.5	n.s.	5.6	5.3	n.s.
Opportunity to learn	6.4	6.1	n.s.	6.1	6.2	n.s.
Advancement	5.0	5.7	n.s.	5.6	5.7	n.s.
Location	5.3	4.9	n.s.	5.2	4.7	n.s.
Salary	4.4	4.9	n.s.	4.6	5.0	n.s.
Coworkers	4.9	5.4	n.s.	5.2	5.5	n.s.
Satisfaction with choice	6.0	6.3	n.s.	6.5	6.2	n.s.
Objective differences						
Previous work experience	3.9	3.0	n.s.	2.5	3.3	n.s.
Age	26.8	16.5	n.s.	26.2	16.7	n.s.
Marital status (1=single; 2=married)	1.5	1.3	n.s.	1.3	1.3	n.s.
Salary increase (1=no; 2=yes)	1.4	1.2	n.s.	1.1	1.2	n.s.
Closeness of supervision	3.1	4.2	2.31•	4.1	4.2	n.s.
Salary accepted	21,495	19,393	n.s.	18,988	19,950	n.s.

•$p < .05$; ••$p < .01$

•Includes only subjects who received more than one job offer.

who accepted a position at a lower salary. Table 3 presents the results of these *t*-tests.

Overall, the general lack of any significant differences that might be attributable either to unmet expectations or to more objective differences in jobs is noteworthy. First, those with many as opposed to only one job offer appeared to have similar expectations and reasons for accepting a position. A significant difference did exist in major unanticipated surprises, with respondents with fewer job offers reporting more surprises. However, an examination of the open-ended responses showed that a number of these unanticipated occurrences were positive, for example, finding that the job was easier than expected or that initial job assignments had changed for the better. No differences in unmet expectations were found between individuals who accepted the highest paid job offer and those who took a lower paying position. Similarly, no strong differences were found across the subsamples for characteristics such as previous work experience, salary increase, actual salary, etc. The only significant difference revealed that subjects who had multiple job offers reported that they were monitored more closely by their supervisor than those subjects with a single job offer.

A final contrast between prospective and retrospective explanations was made by recomputing the volitionality index, eliminating the number of actual job offers and repeating the regressions reported in Table 2. This procedure resulted in a volitionality index representing only perceived choice and not actual choice. Results show the regression coefficient for volitionality to be significant in the equations with attitudinal commitment and job satisfaction as dependent variables. The association of volitionality and behavioral commitment was somewhat attenuated ($F = 2.00$, $p < .16$) but still larger than all variables other than irrevocability. These findings rely on the nature of the perceived choice made at Time 1 and appear to offer some support for a retrospective, socially constructed reality, rather than a prospective, objective one. Although acceptance of the null hypothesis is never definitive, it does appear that, for this sample, there is some evidence that the types of people who had more offers and who accepted higher salaries were not substantially different from the other types. In terms of the accuracy of the information available to make the choice, the reasons for accepting the position, satisfaction with the choice, demographics, and how they were treated, the groups were quite comparable. A one-way analysis of variance by M.B.A. concentration showed no significant differences for major either by offers received or by salary accepted.

DISCUSSION

Main Effects

This investigation attempted to explore two related questions. First, based on earlier studies of dissonance, commitment, rationality, and intrinsic motivation, it was proposed that the manner in which a job choice is made would affect future attitudes and commitment. Consistent support was found for the impact of two aspects of the choice process on subsequent job attitudes. Job choices that were made with greater felt volitionality resulted in significantly higher job satisfaction and commitment six months later (hypothesis 3). Decisions that were perceived of as less revocable were also associated with increased positive sentiments about the job (hypothesis 2). No support was found for the impact of the explicitness of the decision (hypothesis 1) or its publicity (hypothesis 4) on job choice. Overall, these findings suggest that postaction justification may affect commitment and satisfaction. It may be that current attitudes and future behavior are guided by interpretations of past actions, as well as by prospective rationality. Thus, one's response to a chosen job may be a function of how one came to occupy the position as well as of attributes of the job and work environment.

The failure to predict commitment and satisfaction from the explicitness and publicity of the job choice process may reflect the nature of the decision investigated. The act of taking a job is, unlike many other decisions, quite explicit. Many decisions may be taken that have a large amount of equivocality in them or are not highly visible to others. For instance, a decision to quit smoking may be equivocal ("I'll stop for a day and see how I feel.") and not very observable ("I'll stop by cutting down from two packs a day to one."). Such a decision may also vary in its publicity in a way that a job choice does not ("I'll tell only my spouse about my decision."). Although for purposes of this study it was possible to assess gradations of explicitness and publicity, in the larger context, taking a job is a highly explicit and public choice, especially when the sample is drawn from among M.B.A. students who talk to and about others and their job offers. Volitionality and irrevocability, however, can vary widely across a group of respondents.

The results also demonstrated that behavioral commitment was significantly related to turnover 18 months later. These findings suggest a temporal ordering among variables. Consistent with Salancik's (1977: 4) original definition of commitment as "the binding of the individual to behavioral acts," it appears that the volitionality and the perceived irrevocability of the decision bind people to their decision and result in positive sentiments about the choice. Behavioral commitment is then a good predictor of actual turnover a year and a half later. This interpretation of the results reported here is consistent with the view that past behavior serves to anchor future attitudes and to direct future actions. Interestingly, neither attitudinal commitment nor job satisfaction at Time 2 was a strong, independent predictor of future tenure.

Interaction Effects

The second set of questions addressed in this study concerned the extent to which the sufficiency of the original justifications for accepting the job interacted with salient alternative justifications offered at a later point to affect satisfaction and commitment. The results showed the interactions postulated in hypotheses 5 and 6 and again supported the notion that postaction justification may be occurring.

The results for hypothesis 5 showed that individuals who accepted jobs at lower salaries and who received serious inquiries about new jobs were significantly less satisfied and committed than either those who took the highest wage or those who did not receive new job offers. Several reasons for this may exist. First, some evidence is available that shows that intrinsic motivation is susceptible to reinterpretation when the original attitudes and commitment stem from lack of sufficient extrinsic justification (Lepper and Greene, 1975). Thus, it may be that those who accepted a lower salary are more sensitive to the effects of making a decision revocable. Second, although not conclusively demonstrated here, it may also be that a highly salient aspect of a new job offer is the salary. Insufficiently justified subjects may see salary differences as more important than to those who accepted the highest job offer (Taylor and Fiske, 1978). These findings are similar to the strong form of the insufficient justification hypothesis outlined in Pfeffer and Lawler (1980). Unlike their findings, however, the present results suggest that increased behavioral commitment stemming from an insufficient justification may be seriously affected by opportunities to revoke the original decision. The difference may reflect the sample, as the Pfeffer and Lawler study used long-term academic employees and the present one relied on newly hired M.B.A.'s.

The results supporting hypothesis 6 were also consistent with those of previous studies (Lepper and Greene, 1975; Folger, Rosenfield, and Hays, 1978) showing that overjustification effects appear to operate only under conditions of high choice. In this case, we found that individuals were most committed when they either accepted a low offer at some sacrifice (insufficient justification) or accepted the highest offer without recalled sacrifice (inducement-contribution). Thus, a consistency effect appears to have been operating. Just as rewards have been shown to undermine intrinsic motivation under conditions of high choice, it may be that recollections of personal sacrifice can act to undermine the positive effects of high extrinsic rewards under conditions of low choice.

Retrospective and Prospective Rationality

Although it is not possible in field studies such as this to demonstrate causality conclusively, three arguments can be made as to why the retrospective interpretation is a plausible one for this study. First, as shown in Table 3, there appears to be no evidence of significant differences in subsequent attitudes and commitment that can be attributed to the types of subjects who had more job offers or higher salaries, their reasons for accepting a job, their expectations about the position, the types of organizations by which they were employed, or how they were actually treated. Although these data are admittedly not comprehensive, they do suggest that no obvious variations exist across a sample of subjects that might explain job attitudes and commitment six months after they accepted the job. Second, the question of causality in the process of commitment has been addressed in a large number of laboratory studies (e.g., Salancik, 1977; Guzzo, 1979). This research has typically shown that, under conditions of explicitness, irrevocability, volitionality, and publicity, individuals are likely to evince commitment to a position independently of variations in objective reality. The logic in these studies is one of retrospective justification (e.g., Notz, 1975; Lepper and Greene, 1975; Staw and Fox, 1977). The point here is that substantial evidence attests to individuals' tendencies to adjust their attitudes and future behavior to comply with previous actions in spite of any variations in objective circumstances.

Finally, the prospective interpretation for the findings reported here relies on a highly objectivist view of organizational reality; that is, the nature of what constitutes a "good" or a "bad" job is enduring and can be unambiguously determined. The retrospective view is predicated on a more socially constructed reality (Berger and Luckman, 1966; Salancik and Pfeffer, 1978). A number of recent studies have demonstrated that informational influence can be an important determinant of job and task perceptions (e.g., O'Reilly and Caldwell, 1979; White and Mitchell, 1979). Other studies have shown that one's frame of reference and general satisfaction can also affect perceptions of the task (e.g., O'Reilly, Parlette, and Bloom, 1980; Caldwell and O'Reilly, 1982b). This evidence suggests that individuals may adjust their job attitudes and commitment on the basis of factors other than the objective nature of the job.

Since it is likely that both retrospective and prospective processes may be operating, one must ask how likely each is to account for the findings reported here. Because the respondents in this study typically had no prior experience in the jobs they accepted and because there appeared to be no strong differences within the sample, one can argue that, as new entrants to their organizations, reality would be largely socially constructed (Salancik and Pfeffer, 1978; Louis, 1980). Under these circumstances, attitudes and commitment may reflect subjects' perceptions of how they chose the job and others' cues about how they should act and feel, as well as an objective appraisal of the job compared to expectations. Obviously, these

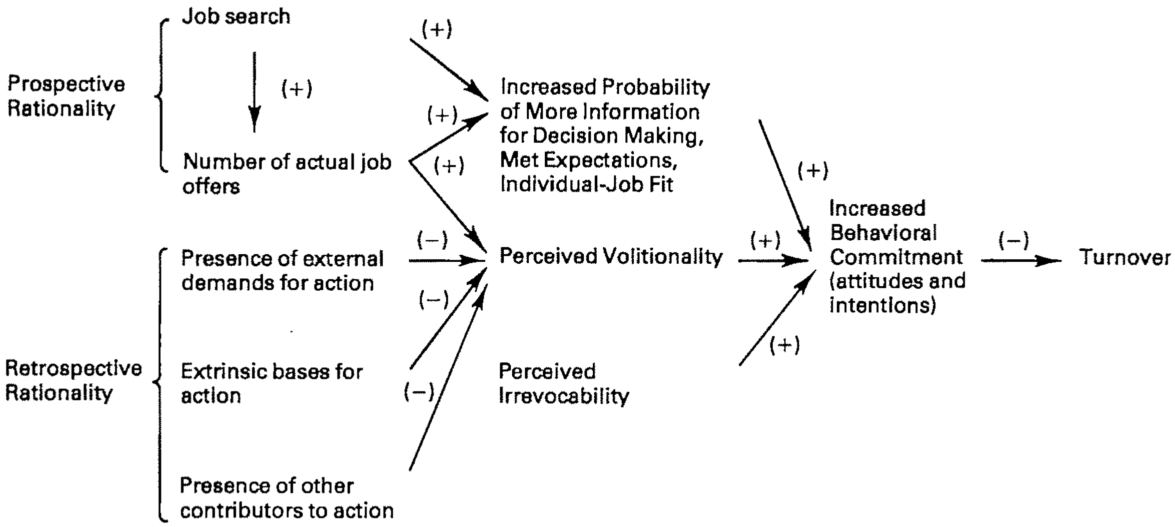
Prospective Rationality
Job search
(+)
Number of actual job offers
Retrospective Rationality
Presence of external demands for action
Extrinsic bases for action
Presence of other contributors to action
(+)
(+)
(+)
(−)
(−)
(−)
Increased Probability of More Information for Decision Making, Met Expectations, Individual-Job Fit
Perceived Volitionality
Perceived Irrevocability
(+)
(+)
(+)
Increased Behavioral Commitment (attitudes and intentions)
(−)
Turnover

Figure. Prospective and retrospective rationality impacts on job choice.

arguments are somewhat speculative, and no firm conclusions can be drawn. The argument made here is that the evidence from this study is compatible with a theory of postaction justification. However, it should be noted that the findings of this study leave unexplained a substantial amount of variance, which may well be attributable to prospectively rational considerations. The Figure presents a model that suggests that both retrospective and prospective processes may affect job attitudes and commitment.

IMPLICATIONS

In practical terms, the findings reported here suggest several strategies for the recruitment and retention of new employees. First, both prospective and retrospective processes can act to shape job attitudes and behavior. More attractive jobs or those that better fit the needs and expectations of the new employee do appear to be related to outcomes such as satisfaction and commitment. It also appears that how the employee makes the job-choice decision can affect his or her future attitudes and behavior. An important facet of this process is the recognition that behaviors during the initial employment period may act to bind the employee to the firm through a process of cognitive realignment of previous attitudes. The social information-processing aspects of recruitment and early employment should be more explicitly considered by managers.

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Interpersonal Attraction and Organizational Outcomes: A Field Examination

Jerry Ross and
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Objective evaluation is one of the basic tenets of rational administrative theory. However, it is widely recognized that several barriers exist to objective evaluation in practice. Informational social influence theory offers an auxiliary approach to understanding organizational outcomes. While informational social influence subsumes a wide variety of elements, three components were selected for examination from the social psychological literature on interpersonal attraction. The relationship of physical attractiveness, attitude similarity, and social background to performance ratings and salaries was examined at two public accounting firms. Motivation and ability measures were included to provide baselines for results. The data were consistent with research suggesting that physical attractiveness may lead to higher outcomes but are less supportive of previous findings on attitude similarity and social background.•

Most participants in organizational life would readily attest that factors such as an individual's physical appearance, social background, and the similarity of his or her attitudes with those of his supervisors have an effect on organizational outcomes. While the impact of these factors has been emphasized by some social scientists (e.g., Kanter, 1977) and substantial literature may be found in the allied areas that examine organizational behavior, relatively little research has been conducted on such topics (Beyer, 1978). This study assesses some of the literature that discusses the relationship between personal characteristics and organizations and provides an empirical examination of these relationships.

Administrators have long attempted to separate objective from subjective criteria when making decisions. The notion of universalistic evaluation was central to Weber's rational bureaucracy; "competence may be measured by one's educational qualifications, previous training, standardized tests, or performance in office, but whatever the criterion, it is applied on a nonpersonalistic basis" (Aldrich, 1979: 12). This view has been incorporated in most expositions of organizational theory. Udy (1962) for instance, argued that one of the stages of bureaucratization occurs when organizational evaluations become disparate from larger societal evaluations, with rewards based on organizational rather than larger societal status assessments.

One area in which objective performance-based administrative decisions is particularly critical is that of employee performance appraisals. Such appraisals are used not only as counseling devices but as central elements in organizational decisions to retain and promote employees. Industrial psychologists appear to be the persons who have taken on the responsibility of securing objective performance-evaluation programs. A large literature reviews attempts to create the appropriate form and content of such evaluations, but despite decades of research, objective evaluations are an elusive goal (Lawler, 1967; Kane and Lawler, 1979).

One formidable barrier to a total utilization of objective performance-related characteristics is uncertainty in the evaluation process. This uncertainty may stem from several sources. Multiple or conflicting criteria for evaluation may be present. In some instances, when finite numbers of criteria are available, it may be difficult or impossible to assess individuals on some, or

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most, of the relevant elements. In evaluating many managerial positions, one would be hard pressed to show that the performance of various organizational elements is the result of the action of an individual employee. The evaluation of managers as potent causal agents may be largely symbolic (Pfeffer, 1977a). In still other instances, despite the need to make differentiations, little variance between employees may be perceived. A combination of pressures, involving factors such as initial selection filters and processes of joint adaptation, may lead to a homogenization of employees (March and March, 1977). Thus, there is the need to explicate the evaluation process when uncertainty exists, as it virtually always does in managerial and professional positions.

Pfeffer, Salancik, and Leblebici (1976: 228) have examined the impact of uncertainty on decision making for grant allocations. They suggested that "when consensually agreed upon, well-defined standards are available for evaluation, decision-making outcomes will be based upon those standards. Conversely, in the absence of shared criteria, processes of social influence will account for more of the variance in decision outcomes." Following Smith (1973), they defined the ability of another to reduce the uncertainty in a decision as "informational social influence." Such influence "occurs without an overt attempt on the part of the influencer to exert influence and, frequently, without the recognition of the person being influenced" (Pfeffer, Salancik, and Leblebici, 1976: 230–231). The use of informational social influence is common in a wide variety of organizational decisions, including decisions on employee selection, evaluation, and promotion. In a laboratory simulation, social similarity has been found to influence the choice of job applicants, particularly when the selector's choice was kept secret (Salancik and Pfeffer, 1976).

While universalistic performance-based criteria are sometimes employed in organizational settings, informational social influence is a second fundamental mechanism for understanding the distribution of organizational outcomes. Decades of research compel us to recognize that objective factors are far from exhaustive and do not allow us a full understanding of decisional processes. The impact of informational social influence has both empirical support and intuitive appeal.

A prerequisite to wider recognition and appreciation of the impact of informational social influence factors on organizational decisionmaking is a more detailed specification of what these factors are. Since a wide range of variables may fall under this rubric, if no basic informational social influence factors can be identified and the factors vary from decisionmaker to decisionmaker, the theory of informational social influence will provide little real assistance. A few of the more salient elements in the informational social influence process can be identified in the literature on interpersonal attraction.

PREVIOUS RESEARCH ON ATTRACTION

Much of the research on interpersonal attraction has focused on attitude similarity. Allusions to a relationship between attitude similarity and attraction are found at least as early as Aristotle and appear again in Spinoza and Samuel Johnson (Byrne, 1971). Empirical studies date from Heymans and

Wiersma's investigation in 1905 of husband-wife agreement. Recent research has found that a person's perception of others, in terms of similarity and difference, generally influences his or her choice of another with whom to interact (Lerner and Becker, 1962). Attitude similarity affects the amount of money one person will approve as a loan to another, even when relevant financial information is held constant (Golightly, Huffman, and Byrne, 1972). Relatively few field investigations have been undertaken in this area. One exception is a simulated study involving "ten days in a fallout shelter" (Griffit and Veitch, 1974), which found support for pre-acquaintance attitude similarity and subsequent attraction.

A second area of interpersonal attraction that has been heavily considered is physical attractiveness. Dion, Berscheid, and Walster (1972) have noted the ubiquitous impact of physical appearance on social interaction. Teachers have been found to rate attractive children as having higher I.Q.s than unattractive children (Clifford and Walster, 1973). Male college students' evaluations of an essay were considerably higher when the alleged writer was an attractive, rather than unattractive, woman (Landy and Sigall, 1974). On the whole, the physically attractive are judged to be more likeable, friendly, confident, sensitive, and flexible than the physically unattractive (Miller, 1970).

While most interpersonal attraction research has focused on traditional psychological variables such as attitudes, some has been concerned with more sociological issues such as social status. The argument over whether status similarity or higher status leads to attraction is longstanding (Horowitz, Lyons, and Perlmutter, 1951; Adams, 1953). Some research has linked economic similarity to attraction (Byrne, Clore, and Worchel, 1966). On the other hand, Walster (1970) tested the hypothesis that individuals prefer romantic partners whose social aspects approximate their own and found, instead, that those of both high and low self-esteem chose the most attractive other.

ATTRACTION AND OUTCOMES IN ORGANIZATIONAL SETTINGS

While substantial research has been devoted to examining the influence of attraction on individual outcomes, only a few efforts have focused on these effects in organizational settings. Two lab studies involving simulated personnel decision making found that attitude similarity was linked to hire/no-hire decisions (Griffit and Jackson, 1970; Baskett, 1973). However, a field investigation conducted in a department store did not find a relationship between attitude congruence and employee evaluations (Labowitz, 1972). Testing physical attractiveness, one role-playing exercise found attractiveness to be an important characteristic in how job applicants are rated (Dipboye, Fromkin, and Wilback, 1975). A subsequent role-playing investigation, however, found less conclusive evidence (Dipboye, Arvey, and Terpstra, 1977). A third role-playing study found physical attractiveness to be beneficial to male applicants but harmful to female applicants (Heilman and Saruwatari, 1979). Socioeconomic origin has been found to have a positive influence on employee salaries (Pfeffer, 1977b), a relationship that was stronger for those in staff positions.

Based on the previous attraction literature, we hypothesize in this paper that attitude similarity, physical attractiveness, and social background will be related to individuals' organizational outcomes such as salary and performance evaluations. No prior study has considered these factors simultaneously. A second goal of this study is to compare the impact of these attraction variables to those of other predictors of performance and salary. In order to provide baselines for the results, this study includes measures of employee motivation and ability as well as the interpersonal attraction characteristics. This should both insure that the attraction results are distinct from motivation and ability factors and allow a comparison of the relative strengths of attraction variables and more conventional predictors of performance and salary.

This study also considers multiple organizational outcomes at more than one site, and in the case of one site, at more than one organizational level. Informational social influence theory suggests that attraction should be of greater importance when more uncertainty exists. Since the existence of "consensually agreed-upon, well-defined standards" varies across organizational levels and outcomes, these data should allow a test of the broader informational social influence theory. As Kanter (1977: 52) notes, "Despite the institutionalization and routinization of much of the work of large organizations and despite the proliferation of management experts, uncertainty remains a generic condition, increasing with rank." Thus, we hypothesize that the higher the organizational level, the greater the reliance on the attraction factors we examine.

METHODS

Several issues had to be addressed prior to collection of the data. One was the process of defining and operationalizing physical attractiveness. Dion, Berscheid, and Walster (1972), for instance, relied on gestalt observer impressions. We have identified three attractiveness dimensions: height, weight, and facial attractiveness. The importance of an individual's height has been recognized for some time (Stogdill, 1948). Some authors suggested that short men not only receive lower starting salaries than tall men, but are also less likely to be hired in the first place (Feldman, 1971). Recent research has suggested that males of middle height might, in fact, be most preferred (Graziano, Brothen, and Berscheid, 1978), but in no studies was shortness discovered to be an asset. Being of an appropriate weight is felt to be of importance in social interaction. Few societies appear to attach as great a stigma to being overweight as ours. As early as kindergarten, children have been found to express an aversion to certain body types, particularly those characterized by chubbiness (Lerner and Gellert, 1969). The third dimension of physical attractiveness, facial attractiveness, we have assessed by evaluating photographs. The use of a photo as an operationalization of facial attractiveness may present some problems, yet photos are unobtrusive and the ratings produced are consistent. Short of videotaping individuals or having peers evaluate appearance (neither or which is very practical), it is unclear how better measures can be obtained.

After choosing the physical attraction variables, baseline measures of motivation and ability were selected. Most research on individual performance in organizations has addressed the issue of motivation through expectancy theory. The general format of the various expectancy formulations is that an individual's motivation is a function of (1) the individual's perception that effort will lead to performance, (2) the individual's perception that performance will lead to outcomes, and (3) the value of the outcomes to the individual. This family of approaches is derivative of the work of Tolman (1932), Peak (1955), Vroom (1964), and Porter and Lawler (1968). Most studies attempting to estimate performance from an expectancy score have achieved correlations of about .30 (House, Shapiro, and Wahba, 1974).

In addition to using this measure of motivation in conjunction with the interpersonal attraction variables, three measures were collected that may reflect an individual's ability to perform. These variables are the individual's undergraduate grade-point average, whether the individual has a B.A. or an advanced degree (virtually always an M.B.A.), and estimates of the quality of the individual's most recent educational institution.

For a variety of reasons, conducting a true experiment involving these variables was not feasible. Instead, data were gathered cross-sectionally. Three recurrent interpretation problems exist in such cross-sectional field investigations. One issue concerns the direction of causality: often it is not clear which variable causes which, particularly when the measures involve assessing the internal states of actors. In this investigation, the causal direction was straightforward. Three variables involved the collection of attitudes, but no priming took place, and the purpose of the attitude items (match with supervisor) was not transparent. A second potential drawback is that the results obtained may be misleading because of the omission of other relevant variables. Thus, one of the variables included might be found to be significant not because it was causally related to the dependent variable but because it was correlated with a "real" predictor of the criteria which was itself not included in the analysis. A third consideration is that even if results appear to be valid, one might question the influence of these variables relative to other commonly employed measures. By including the baseline motivation and ability measures, we hoped at least to partially circumvent these latter two limitations.

Sites, Sample, and Measures

The sites for this investigation were two public accounting firms. Public accounting firms may be seen as having several aspects favorable to results supporting an informational social influence perspective. In general, employees either attain partnership within six years or leave the firm. In both firms, the percentage of new employees eventually attaining partnership was below five percent, despite the fact that both firms stated that having the potential to become a partner was a prerequisite for initial employment. Thus differentiating decisions would be made on a pool of employees at least somewhat standardized in terms of technical expertise.

Since there is some evidence that the impact of physical attractiveness on evaluations is different when interactions involve females (Heilman and Saruwatari, 1979) and since there were far too few female employees in the firms to support even an auxiliary analysis, only male employees were included in the study. If anything, this was a conservative study, since the little research conducted with males suggested that the physical attractiveness stereotype is stronger for females than for males (Bar-Tal and Saxe, 1976).

The first firm provided the names of 252 employees as potential participants in the study. The sample was matched so that all the junior staff accountants in the sample had been supervised in a recent audit by one of the senior staff accountants in the sample, and all senior staff accountants in the sample had been supervised by one of the managers. The second firm provided the names of 116 employees as potential respondents, these being a similarly matched sample of junior and senior staff accountants.

Four dependent variables were collected at the first firm, five at the second firm. At each firm, salary information and employee performance evaluations were collected. Additionally, two questionnaire evaluations were completed by individual supervisors of each employee. These involved evaluations of employees' relative performance and the likelihood of partnership. It was clear from interviews prior to the administration of the instruments that the evaluation of the likelihood of partnership involved the greatest uncertainty. Several respondents stressed that only about three percent of the initial hires would become partners and that a tremendous number of elements, about which little consensus existed, influenced such decisions. Thus, this dependent variable should have been most influenced by the informational social influence factors we considered.

Data to test the hypotheses were gathered in two ways. Some of the data were from company records. At the first firm, salary information and the most recent archived performance evaluations of junior and senior staff accountants were obtained from company records. According to the firm, these year-end ratings were computed by gathering every supervisor's evaluation of an employee and weighting the rating on the basis of the amount of time each evaluator had supervised each subordinate. At this same firm, the researchers and a second member of the accounting department at Northwestern were allowed to visit company offices to Q-sort employee photographs for physical attractiveness. The second firm provided archived performance evaluations, salaries, and photobooks of the office employees. The typical archived evaluations, in this case, consisted of two year-end rankings of all junior staff members. These rankings were computed by averaging the ratings given each employee by each of the employee's supervisors, without respect to the supervisor's rank or the amount of time the supervisor had directed the evaluated employee. This was the procedure the firm stated it employed.

The remaining data for the study were gathered from questionnaires. Response to the questionnaires was voluntary, but both firms provided cover letters endorsing the project and allowed employees to fill out the instruments on company time. At the first firm, 123 junior staff accountants, 46 of the senior staff accountants, and 51 of the managers responded. At the second firm, 65 junior staff accountants responded, as did 12 seniors. Total response rate for the study was 306 of 356 contacted (85.9 percent).[1]

[1] In terms of subsamples, at the first firm the response rate was 93.9 percent (123 of 131) for junior staff accountants, 83.6 percent (46 of 55) for senior staff accountants, and 94.4 percent (51 of 54) for managers. At the second firm, the response rate was 77.4 percent (65 of 82) for junior staff accountants and 61.8 percent (21 of 34) for senior staff accountants.

The questionnaire contained self-reports of height, weight, age, and father's occupation. Individuals were asked to report their undergraduate grade-point averages as well as where they went to school and whether or not they had graduate training. A short-form expectancy-theory instrument was also administered.

Seniors and managers were also asked to provide ratings of employees they had supervised on a recent audit. Two ratings were requested: an assessment of relative performance (bottom 20 percent to top 20 percent, on a five-point scale) and an estimate of the subordinate's likelihood of obtaining partnership (very unlikely to very likely, on a five-point scale).

All respondents were asked to fill out two sets of attitude items. The first set was composed of 24 general attitude items, such as "The best way to control crime is through harsher sentences for offenders." The second set of 12 items dealt with role-specific attitudes, such as "The Financial Accounting Standards Board should prohibit forecasts from being included in published annual reports." Responses to all items were on a five-point scale, disagree to agree. The items were designed to examine a wide range of issues. Both sets of items were constructed and pretested to insure that the items were salient and would provide variance in responses. Seniors and managers were additionally asked to fill out another set of the same general attitude items, giving the answers they thought the average client would give.

The weight disparity item was constructed as follows. The average weight for each individual's height was determined by using the Metropolitan Life Insurance bulletin, "Weight Standards for Men and Women," used by Rodin and Slochower (1974). Individuals were categorized as either within five percent of the average for their height, between five percent and 10 percent of the average, or more than 10 percent away from the average.

Social background was computed based on the respondent's father's occupation. This is a standard approach and has been formalized in a series of tables by Bogue (1969).

The quality of institutions attended was calculated by using College Rater (1973). This book provides observer estimates of the relative quality of most American Colleges and Universities.

Accountants' photographs were rated for physical attractiveness by the researchers and a second member of Northwestern University's accounting department. Each rating was on a one-to-five scale in a forced-choice, quasi-normal, Q-sort procedure (Kerlinger, 1973). In this procedure, raters are instructed to sort the photographs into piles of various sizes — least attractive to most attractive — to approximate a normal distribution.

RESULTS

Table 1 provides the means and standard deviations of the measured variables for the three samples.[2] The profiles of the junior staff accountants at Firms 1 and 2 are substantially the same. Senior staff accountants were older and more likely to be married, had worked in the firm longer, were paid more, and their performance was rated more highly. Their profiles on the

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[2] Year born is the mean year of birth; for example 52 would be 1952. Duration of employment is the number of months employed. For marital status, 1 indicates unmarried, 2, married. For graduate education, 1 is a bachelor's degree, 2 is a graduate degree. Undergraduate grades are categorized as under a 2.5 (1), 2.5 to 3.0 (2), 3.0 to 3.5 (3), over 3.5 (4). Height is height in inches. Weight disparity ranges 1 to 3, with 1 being within range, 2 being between five and 10 percent from ideal, and 3 being more than 10 percent from ideal. The photo attractiveness score is the sum of three raters' 1–5 scores. Archived evaluation at Firm 1 ranged from below average (1) to outstanding (4). Archived technical and professional performance and archived personal effectiveness at Firm 2 ranged from (1) worse than average to (3) better than average.

Table 1

Means and Standard Deviations of Analysis Variables

Variables	Firm 1 Junior Staff Accountants (*N*=97–120)	 Senior Staff Accountants (*N*=43–48)	Firm 2 Junior Staff Accountants (*N*=27–52)
Year born	52.9 (2.1)	50.7 (2.0)	52.7 (2.6)
Duration of employment	40.8 (11.1)	71.9 (15.7)	35.5 (7.4)
Marital status	1.43 (.50)	1.75 (.44)	1.44 (.50)
Bogue — social background	34.0 (9.1)	32.8 (9.4)	34.5 (8.6)
Graduate education	1.31 (.53)	1.21 (.41)	1.42 (.61)
Undergraduate grade-point average	3.14 (.75)	2.98 (.67)	3.19 (.74)
School quality	616.4 (128.6)	615.5 (121.2)	639.8 (164.2)
Motivation	58.6 (22.8)	61.3 (21.1)	58.3 (18.7)
Summed difference in professional opinions	19.2 (8.4)	16.0 (3.7)	17.3 (4.3)
Summed difference in general opinions	31.0 (6.4)	31.3 (5.0)	31.3 (5.8)
Summed difference with supervisor's estimate of client's general opinions	30.4 (6.3)	29.4 (6.9)	31.6 (8.8)
Height	71.4 (2.5)	70.8 (2.4)	71.3 (2.6)
Weight disparity	1.55 (.83)	1.60 (.79)	1.56 (.83)
Photo attractiveness	9.05 (2.89)	9.00 (2.96)	9.23 (2.86)
Salary (in thousands)	15.17 (1.26)	18.67 (1.80)	16.21 (1.83)
Relative performance	3.49 (1.16)	4.35 (1.09)	3.57 (1.25)
Partnership likelihood	2.56 (.91)	3.33 (1.11)	2.63 (.89)
Archived performance	2.50 (.55)	2.90 (.66)	
Archived technical and professional performance			2.24 (.46)
Archived personnel effectiveness			2.16 (.38)

other variables were quite similar to the junior staff accountants.

In general, the independent variables were not highly intercorrelated. There were some exceptions, such as age and duration o employment (−.3 to −.6 in the three subsamples) and age and graduate degree (−.4 to −.5). To focus on the relationship between the attraction variables and the organizational outcomes in the first sample, while the correlations were small (generally under .2), they were virtually all in the direction predicted by previous attraction research, particularly the outcomes other than salary. The results in the second sample, involving senior staff accountants at the same firm, were not nearly as clear-cut. Given the smaller sample size, the only strong relationship found was between height and the likelihood of partnership (.45). For junior staff accountants at the second firm, the pattern of relationships between the attraction variables and organizational outcomes was similar to that found in the junior staff accountants in the first firm, although not quite as strong. Photo attractiveness and height both behaved in the fashion predicted by the attraction literature. The weight disparity item and the three attitude indices showed weaker relationships to the organizational outcomes.[3]

Table 2 displays the unstandardized regression coefficients, with their standard errors, for junior staff accountants at Firm 1. Regressions were trimmed so that only variables that were significant in one of the equations are included in the table. Salaries seem to be influenced by the employee's having a graduate degree, the duration of his employment, and the rating of the school from which he received his degree.

Table 2

Trimmed Regression Results for Junior Staff Accountants, Firm 1

Variables	Salary (N=114)	Archived evaluation (N=114)	Relative performance (N=96)	Partnership likelihood (N=96)
Graduate degree	14.78•••	–.070	–.122	.006
	(1.44)*	(.123)	(.262)	(.240)
Duration of employment	.47•••	.005	–.010	–.006
	(.06)	(.005)	(.011)	(.008)
Quality of school	.019•••	.0002	–.0002	.0003
	(.005)	(.0004)	(.0011)	(.0007)
Marital status	.68	.275••	.114	–.230
	(1.28)	(.110)	(.249)	(.195)
Height	.20	.039•	.064	.101•••
	(.24)	(.021)	(.045)	(.036)
Motivation	–.02	.003	.016•••	.007•
	(.03)	(.002)	(.005)	(.004)
Weight disparity	.46	–.038	–.36••	–.155
	(.76)	(.065)	(.14)	(.110)
Difference with client's	–.03	–.00	–.027••	–.019••
general opinions	(.04)	(.003)	(.013)	(.010)
Photo attractiveness	–.22	.020	.045	.057•
	(.21)	(.018)	(.039)	(.030)
R^2	78	14	25	22

•p <.10; ••p <.05; •••p <.01

*Unstandardized regression coefficients with standard errors in parentheses.

The archived evaluation is very difficult to explain, given the variables. Only the individual's height and marital status appear to be at all related to this index.

By examining the two questionnaire evaluations, substantially more variance can be explained. The rating of relative performance can be seen as a function of the employee's motivation, difference with client's opinions, and his being overweight.

The final index considered was the questionnaire evaluation of likelihood of becoming a partner. In a real sense, this is the ultimate organizational criterion in a public accounting firm. One either achieves partnership or leaves. Here, as informational social influence theory would suggest, the interpersonal attraction factors appeared primary, with weight, photo attractiveness, and difference with client's opinions all being related to likelihood of partnership. Thus the profile of an individual likely to become a partner was a taller, attractive individual who is perceived as having attitudes somewhat similar to those the supervisor feels the client would have. The individual also tended to have a higher expectancy theory score.

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[3] A table showing all correlations is available from the first author.

Social background did not appear to be relevant in the performance evaluations. One reason for its relatively weak showing may be a classification problem. When respondents reported their parents to be janitors or chairmen of the boards of major corporations they were easily classified. However, when respondents listed their fathers as in sales or self-employed, too wide a range of possible social statuses were indicated. Pfeffer (1977b) relied on self-categorized social backgrounds. While less objective, this measure may be more accurate, unless respondents can be coached into greater specificity about less judgmental assessments.

Differences in neither professional nor general opinions with supervisors played a role in organizational outcomes.

Table 3 shows the trimmed regression results for seniors at Firm 1. Only duration of employment appears to be related to salary. At this point, one's credentials, grades, or for that matter, the interpersonal factors examined here no longer appear to be of importance.

Table 3

Trimmed Regression Results for Senior Staff Accountants, Firm 1

Variables	Salary (*N*=47)	Archived evaluation (*N*=47)	Relative performance (*N*=42)	Partnership likelihood (*N*=42)
Duration of employment	.636•••	.014•	.011	.005
	(.173)*	(.008)	(.014)	(.013)
Year born	−1.05	.171•••	.093	.054
	(1.39)	(.064)	(.119)	(.107)
Graduate degree	−.626	−.138	−.902••	−1.07••
	(.558)	(.261)	(.459)	(.41)
Quality of school	.0078	.0009	.0011	.0029•
	(.0183)	(.0008)	(.0067)	(.0015)
Height	−1.01	.046	.104	.247•••
	(.89)	(.042)	(.078)	(.071)
R^2	49	22	20	38

•*p* <.10; ••*p* <.05; •••*p* <.01

*Unstandardized regression coefficients with standard errors in parentheses.

Only age predicts the ratings on the archived evaluation of performance. From the questionnaire evaluations, only educational attainment is substantially related to ratings of relative performance. Those with graduate degrees were reported as performing less well on a relative basis. Three variables are of importance in determining the likelihood of partnership. Again, having a master's degree is negatively related to likelihood of partnership, while quality of school bears a slight positive relationship to the likelihood of partnership. Finally, height appears to be strongly positively related to the likelihood of partnership.

Several differences exist between the senior and junior results. On the whole, prediction of seniors' salary and archived performance was substantially more difficult. After a few years in the firm, a good deal of randomness may enter the evaluation process (March and March, 1977). The screening for these positions is rigorous, and the turnover rate by the fifth year (the average for these seniors) is quite high. The prediction variables, however, to some extent explain the results of the questionnaire evaluations. Height is an important predictor of the likelihood of partnership. Having a master's degree has a negative impact. This may stem from the fact that those who received a graduate degree often did not choose accounting as a first profession; this relatively weaker career commitment may become relevant at this level in the firm. Or, it is possible that although graduate degree holders have had more years of college education, they often have had less training in accounting per se than the bachelor's degree recipients. Greater practical training may be of importance higher in the firm.

Of the specific attraction variables, height was the only physical attraction variable related to the four performance criteria. Motivation, by comparison, was not related to any of the measures of performance.

Weight disparity did not appear to be related to any of the performance measures at the senior level. Part of the reason may be that substantially older managers are evaluating the seniors; older employees may not regard being overweight as detrimental to one's image, as do younger employees.

Unlike at the junior level, the summed difference between seniors' opinions and managers' estimate of client's general opinions was not related to any of the performance measures. The mean difference was virtually the same at the two levels of the firm. The relationship may be different because seniors have earned more idiosyncratic credits than juniors. Having survived an initial screening, they are allowed different opinions. Or perhaps the seniors cloak their unpopular opinions more effectively than the juniors, a possible key to advancing in the organization. Studying professed differences in opinions may lead one to find much stronger relationships than those for merely reported opinions.

While height was the predominant predictor of senior partnership likelihood, the results do not strongly support the view that informational social influence, at least as operationalized here,

Table 4

Trimmed Regression Results for Junior Staff Accountants, Firm 2

Variables	Salary (*N*=39)	Archived technical & professional (*N*=38)	Archived personal effectiveness (*N*=38)	Relative performance (*N*=26)	Partnership likelihood (*N*=26)
Graduate degree	20.72•••	[illegible]42•••	.249•••	.405	.493••
	(2.22)*	([illegible]04)	(.086)	(.321)	(.203)
Duration of employment	.758•••	[illegible]18•	.013	.076••	.040•
	(.210)	([illegible]10)	(.008)	(.034)	(.021)
Photo attractiveness	.780	[illegible]28	.038••	.047	.078
	(.503)	([illegible]24)	(.019)	(.078)	(.049)
Motivation	−.032	[illegible]04	.002	.013	.013•
	(.071)	([illegible]03)	(.003)	(.011)	(.007)
R^2	78	39	37	35	51

•*p* <.10; ••*p* <.05; •••*p* <.01

*Unstandardized regression coefficients with standard errors in parentheses.

is more important at the senior than junior level. The attraction variables appeared of equal importance, especially in the likelihood of obtaining partnership at both levels.

Table 4 provides trimmed regression results for male juniors at Firm 2. As at Firm 1, salary was basically a function of educational attainment. The archived technical and professional rating was a function of duration of employment and educational attainment. The personal effectiveness rating, while heavily influenced by educational attainment, also appeared to be related to photo attractiveness.

Because of the initially smaller sample, the lower response rate at Firm 2, and the necessity of matching respondents (supervisors-subordinates), relatively few responses to the questionnaire evaluations were available. Overall, the results again emphasize the importance of duration of employment, with educational attainment and motivation related to the likelihood of partnership.

In comparing outcomes for juniors at the two firms, we found that the attraction variables were somewhat important at Firm 1 but less so at Firm 2. This may have to do with the "personalities" of the two firms or it may be the result of the particular samples drawn. The third possibility is that there was a difference in the samples; juniors at both firms had virtually identical motivation and abilities scores, but those at Firm 1 had greater average experience with the firm (40.8 to 35.5, $p < .01$). Duration of employment and an advanced degree may be more important at Firm 2 because of the relatively less experienced work force, while at Firm 1 experience has homogenized "actual" performance and made attraction variables greater predictors of rankings.

CONCLUSIONS

Overall, the measure of ability and motivation bore relatively weak relationships to the various organizational outcomes examined, at either level or in either firm. Undergraduate grades appeared of little importance either for salary or rated performance. The quality of school attended had some impact on junior staff accountants' salaries at Firm 1 and on the likelihood of senior staff accountants attaining partnership. Having a graduate degree had a major influence on salaries for junior staff accountants at both firms. The impact on rated performance was quite uneven, however. At the first firm, graduate degree was unrelated to rated performance at the junior level and negatively related to both the likelihood of partnership and relative performance at the senior level. At the second firm, those with graduate degrees scored more highly on several of the performance indices and were also rated more likely to attain partnership.

The results for the expectancy-theory measure were somewhat stronger. Motivation was related to both likelihood of partnership and relative performance for junior staff accountants at Firm 1. It was also related to likelihood of partnership for junior staff accountants at the second firm. It was, however, unrelated to any of the senior staff accountant ratings.

Physical attractiveness was found to be related to many ratings of performance at both levels and in both organizations. The perceived fit between subordinate and client attitudes proved to be important for the questionnaire evaluations of juniors at Firm 1. However, on the whole, the attitude-similarity research is not supported, though this hardly invalidates the previous work in this area. Laboratory research has the general advantage of being able to isolate and control the effects to be studied, a particularly great advantage when something as large and amorphous as attitude similarity is considered. If it had been possible to extensively tap people's domain of relevant opinions in a field study, prior research might well have been supported.

It is important to recognize that the attitude variables were based on self-reports, which may not correspond strongly to the attitudes a supervisor perceives a subordinate to possess. Lay theories of the adverse impact of a lack of attitude similarity may be well developed. Kanter (1977), for instance, notes that difficult or controversial subjects tend to be avoided. Therefore, a more promising approach might be to focus on the social-psychological literature on self-disclosure (Cozby, 1973). One prospect for future research would be an assessment of the impact of gradations of attitude disclosure (both pro and con) on various forms of performance assessments (overall performance or suitability for promotion) under both high and low performance conditions.

While the study provides somewhat equivocal results on the impact of social background or attitude similarity, support is provided for the work of Dion, Berscheid, and Walster (1972), Kanter (1977), and others on the pervasive impact of an individual's physical appearance. Very few field tests of the impact of physical attraction in organizational settings have taken place. The limited amount of previous research has consisted largely of uncontrolled surveys or anecdotal episodes (e.g., *New York Times*, 1974).

This study raises several issues for future research. It appears that different components of physical attractiveness may be operative at different organizational levels and may influence different types of performance assessments. Weight ratings were slightly more likely to be related to measures of specific performance, while height and photo ratings had a more prominent influence on estimates of the likelihood of partnership. This may involve some attributional stance on the part of the evaluators. The researchers were surprised to find that photo attractiveness did not have a very strong impact on evaluations. Though photos may not have been good representations of the individuals, the researchers were generally confident of their validity. The intercorrelation of the ratings of the photos varied, but were usually in the .5 to .6 range. In Walster et al.'s (1966) classic computer dating simulation, the intercorrelation of ratings of the four raters ranged from .49 to .58, but these were in-person, rather than photo, assessments. It may be that although the facial characteristics captured in a photograph have the most immediate impact on impressions of attractiveness, they do not necessarily create the most lasting impressions.

Among the several criteria examined, the attraction variables seemed to be most influential in predicting the likelihood of partnership. The likelihood of attaining partnership involves a combination of many conflicting factors and is certainly a more uncertain evaluation criterion than performance on a field audit. This was true both at the junior and senior level of the first firm, though there did not seem to be a marked disparity between the two levels in the importance given the attraction variables. These results must also be tempered by the lack of replication in the smaller sample of junior staff accountants at the second firm.

In some respects, the results presented here are conservative. The impact of the attraction variables examined, particularly the physical attractiveness variables, are probably subject to a substantial restriction of range. To the extent that these attributes are also employed in selection decisions, as Salancik and Pfeffer (1976) suggested they might be, individuals who are negative on these dimensions are probably not employed in the first place.

Further, the interpersonal attraction variables examined are only a few of a wide variety of potentially relevant informational social influence variables. Even with these two substantial caveats, the attraction variables examined in this study provide us with as much guidance as do standard variables such as motivation and educational background.

Research relating variables such as motivation and ability to performance ratings have consumed much of the field's energy in the last decades. Perhaps because of disenchantment with the results of these investigations, some theorists have suggested a random model of advancement. While there may be some random component, we do not believe individuals in organizations are promoted primarily by chance. Rather, in addition to motivation and ability, a variety of informational social influence factors are commonly employed, and we should now attempt to identify a finite number of these factors that may regularly augment our understanding of evaluation decisions.

We do not argue that attractiveness is of major importance in determining individual outcomes in every organization. The impact of attractiveness is moderated by organization-specific conditions as well as by individual supervisors. However, we would contend that attractiveness is employed sufficiently often to warrant additional study. There are other variables that warrant similar consideration. Using a national random sample of mature males, Pfeffer and Ross (1982) found positive effects of being married, but negative effects of having a working wife, on wage and status attainment. The particularly strong effects for managers are consistent with an informational social influence approach.

Although the results reported here are tentative and not extremely robust, they are suggestive of the potential influence of informational social influence factors currently recognized by organizational participants, if not organizational theorists. In light of the large number and importance of instances in which conditions thought to trigger a heavy reliance on informational social influence are present, future research on such issues clearly seems warranted.

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News and Notes

PAPERS FOR *ASQ* SPECIAL SECTION

This is to remind you that the deadline for submissions for the special section on the Utilization of Organizational Research, announced in the September 1981 issue of *ASQ,* is March 1, 1982. A description of the general topic area can be found in the September issue, but those who wish further clarification may contact Dr. Janice M. Beyer (716/831–3362), who will serve as guest editor of the section.

CALL FOR BOOK-LENGTH MANUSCRIPTS

JAI Press has begun a new monograph series in organizational behavior and industrial relations. The purpose of this series is to publish book-length research monographs of current interest in organizational behavior and industrial relations. Theoretical book-length treatises will also be considered. Monographs bridging organizational behavior and industrial relations are especially encouraged. Inquiries should be sent to the series editor, Samuel B. Bacharach, Department of Organizational Behavior, New York State School of Industrial and Labor Relations, Room 300, Research Building, Cornell University, Ithaca, NY 14853.

CALL FOR PAPERS AND ANNOUNCEMENT

The 1982 Albany Conference on Organizational Theory and Public Policy will be held in Albany, NY, on April 1–2, 1982. The purpose of the conference is to bring the dual thrusts of organizational theory and analyses of public affairs/public policy together. Conference organizers do not expect a unified conclusion, but rather want to examine a diversity of perspectives. Those who would like to have a paper considered for inclusion in the conference or who would like to participate otherwise should contact Richard H. Hall, Department of Sociology, SUNY–Albany, Albany, NY 12222, by January 15, 1982.

NAME CHANGE

Work and Occupations: An International Sociological Journal is the new name of the former *Sociology of Work and Occupations.* The Editorial Board and editorial policy remain the same. The purpose of the name change is to increase the readership of the journal. The change is effective with the publication of the February 1982 issue, Volume 9, No. 1.

CALL FOR PAPERS ON ROLE TRANSITIONS

Under the aegis of the Scientific Affairs Division of NATO, a symposium on strain produced by transitions across roles will be held August 30–September 3, 1982, in Madison, Wisconsin. Using social role theory, the meetings will concentrate on five topic areas: (1) structural characteristics of successive roles as determinants of strain; (2) personality characteristics as moderating factors; (3) the individual's reactions to strain; (4) consequences for the individual, group, and larger social system of different modes of responding to role strain; and (5) intervention strategies for dealing with role strain. Participants will be limited to approximately 20 persons, chosen on a competitive basis to present papers, and 30 observers. For further information, contact either Dr. V. L. Allen, Department of Psychology, University of Wisconsin, Madison, WI 53706; or

Dr. E. van de Vliert, Vakgroep Sociale Psychologie, Vrije Universiteit, 1081 HV Amsterdam, Netherlands.

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The Invisible War: Pursuing Self-Interests at Work

Samuel A. Culbert and John J. McDonough. New York: Wiley, 1980. 225 pp. $12.95.

The invisible war referred to in the title of the book is an ongoing battle, mainly between subordinates and superiors but also encompassing other sets of actors. While the existence of conflict in these relationships is hardly a new discovery, Culbert and McDonough bring an interesting perspective to our understanding of the phenomenon in a fairly easy-to-read, short volume.

The authors contend that viewing the war as a chronic conflict between individual needs and organizational rationality (of which superiors are guardians) is simplistic and illusory. A more useful view is to examine the incompatibility between the self-interests of interacting parties, such as organizational members and organizational managers, and the attempts of each party to couch his or her self-interests in terms of organizational rationality. The result of this conflicting reality construction is a war over meanings. The war is invisible in the sense that overt consensus over the commitment to improved organizational effectiveness masks the hidden agenda of self-interest so that the conflict is hidden from the opponent, other organizational actors, and perhaps even from the warriors themselves. Even when organizational actors are fully aware of their self-interests, there is a substantial risk in revealing them in the typical organizational situation, which inevitably leads to a relationship of deceit.

The book's conceptual contribution to the organizational literature lies in its suggestion that latent conflict (Dahrendorf, 1959) is manifested as an apparently benign struggle to assert a favorable definition of the situation, thus integrating the perspective of social construction of reality with the more traditional view of superior-subordinate relationships.

The authors' point of view is intuitively appealing, but the prudent social scientist should approach their arguments with some skepticism. Any explanation of human behavior that is based on an actor's self-interest is liable to involve a nonrefutable hypothesis (Popper, 1962). The invisible war hypothesis is, in essence, nonrefutable; therefore, the reader needs to be doubly attentive to other criteria against which the thesis can be assessed, such as the internal coherence of its logic, its consistency with relevant established theory, and the degree of support that seems warranted from experience and systematic observation. Culbert and McDonough fall short on each of these criteria.

First, it is apparent at several points in the book that Culbert and McDonough do not have their thesis fully worked out. For instance, they state that "at every point personal needs and organizational goals impact on one another, and it's always up in the air whether the needs of the job or the interests of the individual will swamp the other or whether a synergy of interests will evolve" (p. 68). The reader might expect the authors to have at least suggested conditions under which one outcome is more likely than the other, instead of leaving such an important point "up in the air."

Furthermore, their key concept — "alignment" of the interests of actors with the task requirements of their jobs — arises from a vector metaphor that is not adequately specified. We are told that the direction of the vector corresponds to "orientation," and the magnitude, to "excellence," but the reader is left to infer what these terms actually mean. This vagueness is compounded when Culbert and McDonough use vector resolve (the projection of one vector onto another) to explain compatibility of interests. One would expect an almost orthogonal vector to represent indifference, whereas the authors label this situation incompatibility; they do not allow for negative vector resolves, which would logically represent incompatibility. The metaphor is further confused when the authors later evoke Venn diagrams ("overlap") in describing the "fit" between self-interests and criteria for performance appraisal.

Second, it is not easy to judge the book's consistency with established theories because the authors do not bother to relate their central concepts to closely and obviously related concepts that have a fairly well developed literature. For example, the term self-interest is used loosely without reference to needs, goals, utility functions, intentions, or values. The linkage could be made without rewriting the book for an "academic audience," and would have clarified and strengthened the argument for adopting an "invisible war" view of organizations. Furthermore, the book could have been enhanced considerably by drawing on the body of organization theory that has accumulated under the "action frame of reference" approach (e.g., Silverman, 1971).

Third, the authors support their thesis with simple illustrations, presumably drawn from their own academic and consulting experience. In many instances, this substantiation leaves the reader with an uneasy feeling about how well the authors' ideas have been tested. The reader's malaise is not helped by the authors' tendency to rely on unfounded generalizations, as when they refer to "the ever-escalating level of inauthenticity taking place in organizations today" (p. 109) without offering any clues as to the basis of such an assertion.

In fact, several of the vignettes seem to be chosen on the basis of some other factors than their illustrative value. For example, the authors strongly denounce public accountants for tolerating conflicts of interest and express outrage at their "gigantic six-figure salaries." They also mount several attacks on academia and its reward systems. Most puzzling is their taking a swipe at the University of Southern California. The reader who has accepted their basic thesis is left to ponder what self-interests motivated Culbert and McDonough to carefully construct these attacks as apparently innocent examples.

After presenting their analysis of how self-interests shape organizational relationships, the authors offer a prescription that seems more fanciful than practical. Echoing the panaceas of some of the early devotees of human relations/organizational development, Culbert and McDonough recommend that organizational managers reconcile individuals' needs (i.e., self-interests) with the managers' own self-interested constructions of the organization's goals. They treat only lightly the problems of how one finds out what individuals' self-interests are and what to do when conflicts of interest are irreconcilable.

These unsolved problems leave the reader a little skeptical of the authors' prediction of "organizations changing markedly under the impetus of a critical mass of people who understand how alignments are formed and how alignments determine reaction to organization happenings" (p. 145).

In summary, Culbert and McDonough have written a thought-provoking explanation of interpersonal (and particularly superior-subordinate) communication and the use of a rhetoric of organizational effectiveness to articulate self-interests. Although it is written primarily for student and practitioner rather than academic audiences, there are problems with the development and support of the central hypothesis. Properly worked out, their thesis could have (and perhaps should have) been expressed in a "thought piece" of journal article length.

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Government Departments: An Organizational Perspective

D. C. Pitt and B. C. Smith. London: Routledge & Kegan Paul, 1981. 149 pp. $20.00, paper.

This book is interesting and well written, but the authors try to do too much in too small a space. Like chefs in an expensive restaurant serving small portions, they offer all the right garnishings but leave the customer hungry at the end of the meal. In 150 pages, Pitt and Smith (1) introduce modern organizational analysis to the study of British public administration; (2) criticize the apolitical bias in systems theory; (3) present a brief sketch of the internal power struggles that take place in public organizations over the choice of department goals, technologies, and structures; (4) discuss and question the applicability of contingency theory to public administration; (5) attack the facile transfer of private sector management techniques to the public sector (which the authors label "managerialism"); (6) illustrate the problems of this philosophy in a case study of the "hiving off" of the British post office; (7) discuss the demise of "consensual technocracy" (i.e., public administration without politics); and (8) conclude with an evaluation of contemporary critiques of bureaucracy and a defense of the bureaucratic form as an instrument to assure accountability of civil servants to elected representatives. On each of these topics, Pitt and Smith raise all the right issues but never manage to gain a convincing integration or closure on any of them. To take the restaurant analogy one step further, the customer has been served a meal comprised almost entirely of appetizers.

Pitt and Smith are solid political scientists. Indeed, they are extraordinarily sensitive to the relationships between power, authority, politics, and political resources in shaping governmental organizations; and, in turn, they do a fine job of describing the ways in which government organizations relate to and shape the structure of power and privilege in the larger society. The central message of their book is perhaps best captured by the following passage:

> An organizational analysis of government departments must recognize the significance of politics at two levels. There is the level of internal politics among strategic coalitions, and competing interests. There is the level of macro-politics concerned with the allocation of societal values. Organizational change can escape neither macro- nor micro-politics when it takes place in the public sector. An approach which ignores the political features of public organizations commits the fallacy of seeking administrative solutions to political problems (p. 132).

Indeed, it is the authors' discussion of the fallacy of transferring the logic and structure of business organization to the public sector, without fully appreciating either the political values or interests the department is intended to serve, that distinguishes this book. At a time when the political climate in the U.S. is promoting the privatization of government functions and organization theorists are arguing that variables like size and technology may be more powerful explanatory variables than public or private ownership, a framework for studying public organizations that gives central recognition to the values of public administration (like accountability, efficiency, legality, consultation, fairness, and reasonableness) provides a valuable corrective to more abstract and generic models of organizations.

However, when it comes to issues more directly related to organization theory, Pitt and Smith are on less firm ground and, as a result, are less creative and stimulating. In reading their sections on organization theory in the first four chapters, one is likely to think he is hearing the faint (and in some places, not so faint) echo of Charles Perrow's *Organizational Analysis* (1970). In fact, part of these chapters read as if Perrow's framework had been revived for British public administration. To the authors' credit, they give due recognition to John Child's (1972) strategic choice approach and David Silverman's (1970) action theory perspective, but, unfortunately, Pitt and Smith never manage to develop a convincing synthesis that overcomes the theoretical dialectic in organization theory between determinism and free will.

Government Departments is proposed to be "a necessary corrective to the heavy concentration of organization theorists on the business firm and to the traditional, essentially descriptive, treatment of public administration" (back cover). By applying organization theory — really organizational sociology — to the government department, the authors aim to present an approach that will be helpful in understanding the interdependence and differences between the public and private sectors. But in their almost exclusive reliance on organizational sociology, Pitt and Smith may have created an anachronism, i.e., a model for studying public administration that has been tried in the United States and has been found wanting. As has been argued by Salamon (1981) and others, the open systems model of organization, concentrating on the department, fails to account for the complexity of interorganizational and intergovernmental arrangements on both the input and output side of public programs. In fact, in the U.S., the structure and dynamics of policy arenas and intergovernmental policy implementation networks may be far more important determinants of program effectiveness than the structure and processes of the department charged with administering the program. Even though the department may be a more important unit of public management in Britain than in the U.S., one cannot help but wonder whether the reliance of the British government on the private sector and regional and local authorities does not also suggest the presence of a more complex system of policy management than that captured by the Pitt and Smith framework. At a time when many American scholars are moving to explore public policy and management through broader lenses and units of analysis, Pitt and Smith's work strikes one as a throwback to the late 1960s and early 1970s, when sociologists and political scientists were first applying organizational theory to the public sector with good results.

On a more positive note Pitt and Smith really shine when they stick to the traditional strengths of British public administration scholarship — historical descriptive analysis and political theory. Their examples are interesting and informative; their detailed case study of the British post office department is well done and complements their central arguments; and their appraisal of the Fulton Commission Report is an illuminating discussion of the hazards of overgeneralization in administrative theory and practice. In short, *Government Departments* is useful and interesting but, nonetheless, hardly a conclusive explication of the workings of public organizations.

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Bureaucracy and the Labor Process: The Transformation of U.S. Industry, 1860–1920

Dan Clawson. New York: Monthly Review Press, 1980. 284 pp. $16.50.

For the past few years, a number of young and not so young scholars have tried to integrate two apparently contradictory traditions and languages: Marxist political economy and the sociology of organizations and work. This effort has drawn inspiration from Harry Braverman's (1974) *Labor and Monopoly Capital*, although subsequent authors have made clear their intention to critique, modify, or supercede Braverman's views on scientific management, if not on the ongoing "degradation of labor." With Dan Clawson's book, the Marxist approach has reached a new level of intellectual maturity. The work contains signal qualities. Among these are (1) corroboration of Braverman's contention that scientific management was *the* crucial element in transforming American industry after 1900, (2) the use of rich historical data, especially accounts from the business press and government documents, lending flavor and detail to a portrait of nineteenth-century work and workers, (3) attention to *bureaucracy*, especially the genesis of bureaucratic technique, often overlooked by Marxists, and (4) a voice that is, at once, politically engaged, yet characterized by dispassionate scholarship.

Clawson argues that bureaucracy, as we know it today, emerged from intense class conflict between 1860 and 1920. Struggles between employers and workers focused on the issue of control over the labor process, specifically how the work would be done, who would be responsible for doing it, what tools and machinery would be employed and introduced into the factory, and over the meaning of a "fair day's work." The skills and knowledge of workers, especially those in the skilled trades, put limits on management's capacity to control and to innovate. Thus, smashing the crafts unions and appropriating knowledge previously held exclusively by workers became a priority for newly class-conscious capitalists. Workers, of course, fought back. The move towards piecework after 1880 allowed managers to increase their control over the shop floor but still required workers to supply initiative and knowledge and, as we know, lent itself to restriction of output. Nevertheless, piecework generated new levels of bureaucracy and administrative overhead since it complicated the accounting process and demanded statistical records of personnel performance.

The routinization of tasks and the degradation of the worker's labor, characteristic of the Taylor movement, had numerous consequences. Workers had less individual leverage in the labor market, as their skills became more narrow, and less collective power in the workplace, as they became separated from each other and divorced from a crafts tradition. Consequently they became less militant, for they had less to protect. But scientific management meant more. It necessitated bureaucratic structure, since planners, technicians, time-and-motion men, and clerical workers were rapidly added to the firm's payrolls, and they, in turn, developed and evaluated the procedural specifications that increasingly defined each worker's day. Clawson's argument is not entirely new, but he adds some fresh twists and new data, suggesting that non-bureaucratic work organization was efficient and competitive, until at least the 1880s, and that bureaucracy was a means of class, not organizational control, since it legitimates and formalizes workers' powerlessness. Lastly, he claims that scientific management and change in the organization of work generally had to *precede* introduction of new technology, as the latter depended on a less skilled labor force that had little incentive to block technological innovation. It is significant that he goes beyond the prevalent tendency of Marxists to see employers as effectively calculative, almost omnipotent, movers and shakers. Instead, he views managers as both active and reactive, initiating and responding to continuous class conflict, over which they have only partial control.

The evidence Clawson uses to substantiate his major arguments is interesting and, in places, compelling. I was particularly struck with the quality of his long chapter on "inside contracting" in the metal-working industries, for this material is new to students of bureaucracy. Contractors were part foreman, part jobber, part entrepreneur. They did business with only a single firm, using that company's materials, plant, and equipment, and they were themselves employees. He carefully points out that the contracting system, even when the contractor did not himself "work," was hierarchical but not bureaucratic. There was an absence of formal qualifications, written files, or levels of authority, and few actual rules existed. Using contemporary accounts and company records, Clawson convincingly demonstrates that the contracting system was widespread across industry sectors and was frequently utilized even by companies predominantly engaged in mass production and by those manufacturing interchangeable parts. More important, inside contractors could employ as many as 200 workers (although the typical number was far fewer), productivity was acknowledged as being quite high, and contractors and their employees were apparently more likely (and more motivated) to innovate and to develop labor saving machinery and practices than were their counterparts in bureaucratically organized firms. According to Clawson, inside contracting was abolished not because employers were dissatisfied with either its efficiency or its technical capacity, but because they wished to shift additional income to the company and establish a more "appropriate" status structure whereby college-trained managers would earn more income than the contractors who were their nominal subordinates. The development of this theme tends to substantiate the Marxist argument that the bureacratization and rationalization of industry had a strong *political* dimension largely ignored by those who claim that bureaucracy exists solely because of its technical superiority

The chapters on craft production, on employers' early efforts to undermine it, and on scientific management are equally well argued and subtle. Clawson argues that Taylorism dominates the thought of top managers, engineers, and work designers, even where it is not fully enshrined in the day-to-day organization of work. This has been true for three-quarters of a century. Clawson points not only to the quantity and circulation of management journals, describing scientific management in action, but also to accounts of very similar practices in factories where no Taylor disciple had tread. Equally important, the spread of Taylorism consolidated managerial class consciousness, since employers faced the common problem of how to circumvent workers' previously successful resistance to efforts directed at increasing the speed of production.

Bureaucracy and the Labor Process is a persuasive book that increases our understanding of the relationship between rationalization of productive technique, the rise of bureaucracy, and class conflict. That self-organized workers were capable of both high productivity and innovative creativity and that these very qualities posed a serious threat to capitalist hegemony before World War I seem sensible propositions. At the same time, it is not clear that craft production or the inside contracting system could have effectively incorporated successive waves of unskilled, non-English-speaking immigrants, could have been as productive on an endlessly growing scale, or could have developed new products as well as changes in manufacturing process. While it is possible to imagine industry managed by workers — indeed examples exist today — the crafts system itself may not have been capable of doing so. In fact skilled workers at times resisted the desires of less skilled brothers and sisters to share in their privileges. It is also possible that contractors employing several dozen workers shared the same advantages of proximity that characterized the owner of a small manufacturing firm but also might have been equally powerless in the face of a hostile market. In a capitalist system, productive efficiency may be less important than monopoly pricing power. Moreover, the growth of industries — meatpacking, clothing and textile manufacture, chemicals — that depend somewhat less on a high proportion of skilled labor is given little attention by Clawson.

Clawson seems to be arguing implicitly that things could have — might have, should have — been different had employers not rallied around Taylor's banner and, consequently, bureaucracy, as a means of controlling recalcitrant workers and thereby guaranteeing capital accumulation. It is surely difficult to disentangle cause-and-effect relationships, and we can hardly expect the historical sociologist to deal with hypothetical situations. However, we need a better answer to the question of whether the historical pattern Clawson describes might not have occurred without Taylor and the system he and his disciples so vigorously spread. Taylor, like Henry Ford, was a pivotal figure, but it is probable that he only initiated and accelerated trends that seem inevitable. Nevertheless, we can be grateful that Clawson has so well presented both the political motivation behind and the political ramifications of the efficiency movement in turn-of-the-century American industry and that he has provided new understanding of the genesis of industrial bureaucracy.

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Power and Politics in Organizations

Samuel B. Bacharach and Edward J. Lawler. San Francisco: Jossey-Bass, 1980. 249 pp. $15.95.

Those symbiotic twins, power and politics, have in recent years garnered increasingly more and more attention in the organizational sciences. Nearly everyone agrees that power and organizational politics are difficult to conceptualize and measure. Within the last decade, the challenge of overcoming this difficulty has attracted several of the best minds, which is fortunate indeed. Conceptualizers from Goldhammer and Shils (1939), Parsons (1963), and Lukes (1974) through to Wrong (1979) have devoted considerable effort to differentiating power from influence and persuasion, and determining the bases, forms, and uses of power. Paralleling the conceptualizers have been empircists who, perhaps out of frustration with definitions, have sought to measure power and its dynamics. Some of these efforts have obliterated the issue of power altogether. Other researchers have noted the powerlessness of the powerful, tied power to cultural and social presuppositions or to superior/subordinate relations, and so forth. Throughout, empiricists and conceptualizers alike have repeatedly faced the same dilemmas — how to portray distinctiveness without diminishing pervasiveness, how to describe the diversity of manifestation without obscuring the singular phenomenological continuum, and how to acknowledge its relationality and its as stably appropriated facticity. In their attempts to confront these issues, scholars in various disciplines, especially in sociology and political science, have tended to utilize quite diverse perspectives or approaches.

The book under review here represents a line of work on power and politics that, to a surprising extent, confronts and overcomes past conceptual issues. The ideas in this book lend themselves to empirical testing. Much of this book's success, no doubt, can be attributed to the author's assumption that organizational life is dominated by political interactions and to their choice to adopt an action perspective using groups and coalitions as the units of analysis. This perspective is not unique, of course, since power and political processes were central to Pfeffer's (1978) treatment of organizational design, Abell's (1975) vision of organizations as bargaining and influence systems, and other studies of organization development (Morhman and Morhman, 1977; Huff, 1980), organizational decision making (Pettigrew, 1973; Salancik and Pfeffer, 1974), and organizational behavior (Schein, 1977). One could even go so far as to say that the political approach to organizations that incorporates power has become a major school of management thought (Tushman, 1977). Bacharach and Lawler have very usefully focused our attention on the integration of the social psychology of politics with the structural analysis of organizations, bringing coalitions, bargaining, and conflict to the fore.

The authors begin their book with an argument for their perspective. Eschewing the common image of organizational members as oversocialized and the current macro-institution theory on organizational transactions, both of which foster an apolitical view, they note that the group is the only viable unit for intraorganization political action and that assuming this unit of analysis calls for using the concepts and models of social psychology. After reviewing alternative conceptions of power, the authors take the stance that power is best understood as a sensitizing device, that is, it is a primitive term and hence primarily a heuristic. Thus, the form (the basic configuration of the phenomenon) of power becomes relevant. Three dimensions of form are specified: the relational, dependence, and sanctioning aspects. Examining interaction, exchange, and reward and punishment manipulations is thus central to analysis of the form of power. The content of power follows from the form dimensions and the distinction between authority (the formal, structurally based, involuntarily submissioned, sanctioned right) and influence (the formal, dynamic, voluntarily submissioned, personal, expertise or opportunity-based, legally ambiguous, multidirectional, tactical element). Organizational politics, for the most part, take place in the realm of influence. Understanding coalition formation and processes is therefore important to understanding power in organizations.

Bacharach and Lawler appropriately sidestep work groups to focus on interest groups, groups of actors aware of their common goals and fate beyond work interdependence, and on coalitions, groupings of interest groups committed to achieving a common goal. Chapters 4 and 5 of the book deal with coalition processes and examine, in turn, how the authority structure affects these processes and how interest groups form coalitions. Five major coalition theories from social psychology (Caplow's power theory, Gamson's minimum resource theory, Komarita's weighted probability model, Komarita and Chertkoff's bargaining theory, and ideological-distance models) were used to demonstrate the implications of the ways the formal stratification system affects coalition formation. The authors note that, in general, the hierarchy of authority promotes subordinate coalitions against upper management and that centralized systems are less vulnerable to coalition processes. Quite rightly, the authors have moved beyond the zero-sum and perfect information aspects of these content-free theories. Subjective, expected-utility theory is the basis for predicting whether interest groups will engage in individual interest-group politics or merge into a coalition. Bacharach and Lawler find resource scarcity, modified by such issues as retaliatory capacity, environmental uncertainty, ideology, and communication opportunity, to be fundamental.

Once coalitions are formed, conflict can occur. The power struggles in such conflicts (which the authors maintain are not necessarily distintegrative to organizations) are managed through bargaining. The authors develop a typology of bargaining relationships by linking integrative versus distributive bargaining with tacit versus explicit bargaining, to distinguish formal and informal, cooperative and competitive bargaining modes. The book's argument leads inevitably to a model of bargaining tactics. Since the essence of bargaining is tactical action, here the sterile game-theory models are replaced by an impression-management game model in which deception and bluff are critical, tactics that, following level-of-aspiration theory, hinge on the degree of toughness exhibited if impasses are to be avoided. Power-dependence ideas are used to describe how coalitions compare current and potential outcomes in power relationships; the tactical dynamics of action and counteraction also reflect dependence relations. Sanctioning possibilities, primarily through threat, constitute the basis for coercion tactics. While deterrence and conflict-spiral theories predict different coercion usage and threat effectiveness, depending on structural features of centralization and formalization, coercion method is as important as its content. In this view, coalition networks provide the imagery for portraying the morphology of organizational politics at the aggregate level. The book concludes with a chapter that identifies some properties of influence networks and suggests that a political model of organizations inevitably must deal with pluralistic goals by means of a pluralistic influence network.

Enough of *Power and Politics in Organizations* has been shared so that its importance, relevance, and conceptual leads may be appreciated. It does not pretend to have provided the last word;

indeed, it is content with beginning to flesh out a new approach of considerable theoretic power. This it surely does. Bacharach and Lawler nicely stick to their self-assigned task of conceptually clarifying intraorganizational politics. That they so consciously rely on social psychological ideas and models is refreshing as well as insight producing. Some of what they offer will seem familiar, even mundane, while other ideas are undeniable contributions. That the familiar and the new insights all stem from the same tight reasoning lends credibility to them all. While obviously a theoretical work of epistomological relevance to organizational reality, the book has numerous testable hypotheses explicitly stated (103, to be precise). Since these, separately or in conjunction, do not call for a new methodology, the authors have rather brilliantly avoided the common criticisms directed at most theoretical works. One might ask, after reading the book, how their approach relates to transorganizational politics, how coalition processes are tied to goals common in contemporary systems, what this perspective shares or doesn't share with other views on organizations (e.g., general systems), what is the impact of technology on organizational politics, how are system stabilization and change influenced by influence networks, and how they would deal with the implication that some values triumph under their perspective while others wither? But to expect answers to these questions asks more than the authors promise or any reader should justifiably expect.

After writing the last paragraph, it has suddenly dawned on me that I have perhaps down-played my real feelings in this review. In truth, over time I have grown increasingly positive about this book and really wish to influence my readers to acquire, read, digest, and be inspired by it. Of course it's not perfect, but it's very, very good indeed. Of course, it's potentially controversial, but work that pushes us forward always is at first. Of course it's dense, but so what? This book, in my opinion, is a rich, timely, and important one that will serve as a seminal work for years to come.

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Democracy, Authority, and Alienation in Work: Workers' Participation in an American Corporation

John F. Witte. Chicago: University of Chicago Press, 1980. 216 pp. $20.00

Is industrial democracy feasible for American manufacturing enterprises? Will industrial democracy ultimately be essential for countering the forecasted increase in work-force alienation, or will it be viewed as merely a fad? Given that our political system is a representative democracy, does it necessarily follow that our productive system should also be a representative democracy? These are some of the questions considered in *Democracy, Authority, and Alienation in Work.*

The book is largely a recounting of the author's two-year involvement as a participant-observer in a high-fidelity equipment manufacturing firm that experimented with various forms of worker participation. The industrial democracy project involved two primary forms of worker participation: joint worker-management policy-making councils and committees that were representatively constituted, and experiments with autonomous and semi-autonomous work groups. In order to assess the effects of these programs, the author collected and analyzed data from a variety of sources: surveys, tape recordings of joint worker-management decision-making groups, the outcomes of referenda, a personal diary, waves of interviews, and off-the-record remarks by top-level managers. Despite presidential support for the project (the firm's president initiated the industrial democracy program), the measurable consequences on dimensions of productivity, turnover, and scrap were not encouraging for those who are advocates of worker participation. Attitudinal changes (on such dimensions as satisfaction and alienation) were evidenced, but sometimes in puzzling directions (e.g., workers who were relatively more involved in participative decision making reported significant increases in alienation).

Unfortunately, there were a number of methodological limitations associated with the study. Most notably, no control groups were created. Also, staggered interventions and multiple baselines were apparently not considered. Long-term trends in company-wide labor productivity data, which were gathered before and during the interventions, were difficult to interpret with any degree of confidence because of concurrent changes in policies, job design, and personnel. Furthermore, the industrial democracy program was introduced shortly after an apparent bottoming-out of a company-wide downward trend in labor productivity. Therefore, regression toward the mean, Hawthorne effects, and coincident events could account for a reported slow return to a near-average level of productivity during the program. From conversations with top-management, Witte also gained information that sales and profits improved during the two-year period of the program. Of course, without hard figures and a formal comparison group, it is difficult to relate the evidence on sales and profits to the effectiveness of the program. Witte recognizes the difficulty of making any causal attributions from his evidence and is correctly cautious in his conclusions. In an examination of change scores for the attitudinal measures, he is similarly guarded in that he frequently reports only descriptive summarizations (i.e., averages and ranges) of change scores (Tukey, 1977).

Aside from the methodological shortcomings, Witte's study is an ambitious and admirable undertaking. Also, his writing style is of the highest quality. Yet, he seemed less than totally objective in his role as participant-observer. My impression was that he strongly advocated industrial democracy initially (he received no remuneration for his activities and was visibly identified with the industrial democracy program), but his advocacy waned as the program approached an ambiguous ending.

How should industrial democracy be operationalized in politica terms so as to ensure its realization or existence? That is, wha are the critical definitional mechanisms of industrial democracy? According to Tannenbaum (1968), a democratic organization is characterized by groups at the lower levels in the hierarchy having greater control relative to groups at higher levels. If we accept this definition, then the degree of democratization achieved within the firm is subject to question, in that the firm studied did not permit the worker councils and committees to have control over wage structures, nor were the worker councils and committees successful in setting up a grievance procedure. Therefore, the original, traditional authority structure of the firm retained control over a number of important aspects of the workers' lives. Because the top management c the firm did not relinquish control over various domains of decision making, the program came to be viewed by many participants as an exercise in illusory democracy. Exercises in illusory democracy, of course, quickly produce feelings of bitterness and resentment. Perhaps it can be argued that this study (as well as many other studies in this topic area) does not, therefore, represent a test of industrial democracy, in that a powerful form of industrial democracy was not actually established.

Many of Witte's observations reaffirm what change agents anc researchers have come to anticipate when making humanistically-based interventions. The following is a sampling: organization officers who are predisposed to experimen with worker participation are likely to be atypical (the presiden of the firm under study had completed a doctoral thesis on wor humanization), supervisors are likely to resist increased worke control, cooptation is likely because of workers' initial lack of experience in decision making and lack of ready access to decision-relevant information, and attitudinal dimensions are more susceptible to change than productivity dimensions (Locke and Schweiger, 1979).

The author provides interview data which suggest that many workers simply did not desire to participate in decision making Witte interprets this evidence in terms of societal norms and features of task structure serving as determinants of the limits of worker interest in participation. For example, consider the following quote from an interview with an employee, ". . .

(following) authority is the way we're used to working" (p. 124). Also, many of the quotes taken from interviews are of the form: "I don't want the responsibility of hiring and firing other people." These statements make sense in light of available evidence which suggests that a strong conformity to traditional work values is perhaps characteristic of the working class. This conformity (which is a likely product of parental emphasis on obedience to authority as a means of ensuring their children's survival in lower-level jobs) probably serves, to some degree, as a brake on social mobility (Kohn, 1977).

A further argument is made by Witte that authority facilitates communication, coordination, and conflict repression/resolution. Therefore, the dissolution of traditional hierarchical authority by work-participation schemes creates problems in the areas of communication, coordination, and conflict and offers no simple, quickly derivable mechanisms for handling these processes. This difficulty is compounded by the reluctance of some workers to accept various forms of responsibility that are, by tradition, in the realm of management. To illustrate, two work teams that were given full autonomy eventually returned, by worker choice, to their previously-existing work group authority structure.

Witte contends that the widespread acceptance of traditional principles of meritocracy (which endorse the exploitation of human differences and emphasize individual competition) runs counter to principles of democracy (which are based on notions of political and substantive equality and which stress cooperative and communal behaviors). Because employees have individual goals that are generally accepting of the profit objective of enterprises and because they lack a strong commitment to the principles of worker participation, it is unlikely that industrial democracy will take root in the U.S. From a Marxist viewpoint, it could be similarly argued that the proletariat's acceptance of bourgeois norms (i.e., acceptance of the traditional power structure) results in the misperception of what is actually in their best long-term interest. Until there is a groundswell of workers who demand the drafting of a Workers' Bill of Rights (e.g., freedom of speech in the work setting, freedom of assembly in the work setting, etc.), it is not likely that industrial democracy in the U.S. will be anything more than a repetition of natural experiments sponsored by relatively idealistic individuals and administered by consultants who are essentially pro-management.

Although Witte's explanations for why many American workers would not wish to participate in decision making are cogent, it is necessary to note that his explanations are largely limited to traditional, profit-oriented, manufacturing enterprises. Not-for-profit, professional, service-oriented, and volunteer organizations are exempt from his arguments and are largely ignored in his theoretical treatment. Worker participation in these alternative organizational forms is certainly of potentially greater relevance.

Of special interest are Witte's contrasts of the results of his research with the results of international experiences with worker councils (i.e., experiments in Canada, Germany, Great Britain, Israel, Norway, Sweden, and Yugoslavia). Overall, the results on which Witte focuses are amazingly parallel. For example, most workers were generally uninterested in obtaining information about the activities of joint worker-management councils, apathy regarding elections increased over time, and managers typically spoke more, made more proposals, and had a greater percentage of proposals accepted in council meetings.

Witte cites many obstacles that interfere with the realization of industrial democracy (e.g., physical limitations of space, time, and communication; workers' competence; workers' belief in the appropriateness of participation; and problems of documenting positive outcomes on attitudinal and performance indices). The documentation of these obstacles and the resulting recommendations for enhancing the effectiveness of future efforts at industrial democracy make this book particularly valuable to work humanization specialists who desire a detailed account of one organization's encounter with industrial democracy.

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The Politics of Mistrust: Estimating American Oil and Gas Reserves

Aaron Wildavsky and Ellen Tenenbaum. Beverly Hills, CA: Sage, 1981. 363 pp. $22.50, cloth; $9.95, paper.

One genre of policy studies is exemplified by its fill-in-the-blank titles: "The Politics of ________." In the blank may be inserted any relevant issue or area. Aaron Wildavsky is a master of this form (e.g., Wildavsky, 1964), and in this case study, co-authored with Ellen Tenenbaum, the authors have tackled the issue of energy — specifically, the political antecedents and consequences of estimating the nation's energy resources and reserves (the former refers to the total amount of oil and gas in the earth and the latter to oil and gas already discovered and available under current market and technological conditions).

The authors' study is inspired by an overriding characteristic of energy policy — that it is likely "the worst-handled policy problem of the century" (p. 9). This mattered less when domestic supplies were cheap and abundant. Since the 1970s, however, this failure represents a crisis in policy making of the first order.

On its face, the problem of estimating energy resources and reserves would seen to be a relatively technical, nonpolitical matter. Yet as the authors demonstrate, this seemingly technical subject is steeped in politics, to the extent that reserve estimates vary with the policy preferences (or biases) of the estimate source. Thus, a gas pipeline company offered high reserve estimates when the Federal Energy Regulatory Commission insisted that there be ample gas reserves to justify construction of a new pipeline. Conversely, when the Federal Power Commission's gas-pricing formula indicated an inverse relationship between reserves and market price, industry came in with lower reserve estimates.

Discrepancies in reserve estimates are not just a contemporary problem, nor are they random occurrences. Wildavsky and Tenenbaum identify two persistent, longstanding perspectives that lie at the root of much of the energy estimation controversy. The first, which they label the quantity theory, views the earth's resources as finite, and advocates of this theory therefore seek conservation and government intervention to cope with energy problems. The second perspective, price theory, urges reliance on market forces to cope with shortages. In this view, the world is an adaptable place where market forces will spur new discoveries and technologies without the meddlesome hand of government. The interpretation of energy estimates by large and small energy producers, who favor price theory, and consumerists and preservationists, who favor quantity theory, are thus colored by these normative predispositions. Energy estimation is fraught with technical uncertainty and there is room for considerable refinement and improvement of the estimation process. But, as the authors argue, better estimation will not resolve opposing political-economic biases and suspicions. The authors do flirt with the more conventional contention that the problem of policy indecisiveness stems from failings in the state of the art, that is, unreliable estimates. The view that better estimates would yield a political consensus seems a straw-man from the outset, however, and in fact proves to be a minor element in explaining the energy policy quagmire.

The "politics of mistrust" that has arisen from these normative biases has made it impossible for those involved to reach a mutually satisfactory course of action, with the exception of wartime consensus, which is discussed in Chapter 4. The schizophrenic reaction of government has entailed a reluctance to allow industry free reign, combined with indecision over how and where to control it. The outgrowth of this confusion could be seen in the mid-1970s, for example, when the price of domestic oil was kept down by subsidizing imports while, at the same time, public concern and debate focused on lessening our dependence on OPEC oil.

The bulk of the book traces the currents of the politics of mistrust historically, from the turn of the century, and its contemporary effects on the behavior of Congress, federal energy-related agencies, and the private sector. The book is organized in three parts. The first sets out the conceptual and historical distinction between price and quantity theories of estimation and describes how relevant actors array themselves on these theories (Chapter 1). It then discusses the historical evolution of this controversy (Chapters 2 through 4). Part Two centers on the energy crisis of the 1970s and the parallel information crisis that energy shortages engendered. The magnification of the information "gap" surrounding reserve and resource data, prompted by the necessity of decision-makers to formulate policy alternatives, is discussed in Chapter 5. Information problems remained unresolved as the issue was bucked to the bureaucracy. The implementation and evaluation problems are outlined in Chapters 6 through 8. Chapter 9 summarizes and evaluates the relationship between data and policy. The final section (Chapters 10 through 12) grapples with the normative and empirical confusion surrounding the estimation problem by attempting to generalize about the relationship between energy data and policy, examining policy alternatives and suggesting some resolution.

The primary value of this book is to be found in its identification and extraction, like oil from shale, of the political currents of this issue. By mapping out in exquisite though often tedious detail how the government has failed to generate anything resembling a consistent, coherent energy policy, the authors have shown technology to be the often unwitting tool of larger political imperatives. Given that politics is the problem, Wildavsky and Tenenbaum conclude by outlining some ways of enhancing the political reliability of estimates and mapping out some realizable avenues to a political settlement. If public problems involving highly technical matters are to be resolved, the bridge between data and decisions must be traversed correctly. The authors have incisively illuminated the path by providing an inductive framework to explain longstanding policy failure and then prescribing sensible remedies. This book should, and I hope will, attract the attention not only of energy-conscious social scientists and physical scientists, but of political actors as well.

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Theories of Trade Unionism: A Sociology of Industrial Relations

Michael Poole. Boston: Routledge and Kegan Paul, 1981. 265 pp. $35.00

At first, I judged this book to be about the development of knowledge in industrial relations, a sociology of knowledge of the field, if you will. Later, I revised that judgment and concluded that the book attempts to synthesize theoretical perspectives on unionism and to delineate a framework for analyzing labor and trade unionism. Still later, I decided that in its focus on empirical research, the book is primarily intended to promote multivariate analyses of union behavior, with an emphasis on sociological concepts and variables (e.g., structure and status). I confess that I remain uncertain about which, if any, of these is the principal objective of the book. Therefore, I shall proceed by describing and critiquing the book and will leave it to the reader to resolve the issue of the volume's central objective.

In Chapter 1, Poole reviews early theories of the labor movement and, borrowing from Mark Perlman, classifies them as follows: moral and ethical approaches, represented by Durkheim, for example; the revolutionary tradition, in which Marxism plays a leading role; unionism as a psychological or defensive reaction to industrialism, with which the works of Selig Perlman and Hoxie are closely identified; the economic foundations and purposes of trade unions, as reflected, for example, in the work of the Webbs; and democratic and political aspects of unionism, which have been explored by Chamberlain, Commons, Cole, and Flanders, among others. Poole's treatment of these theories is brief indeed, and his main concern in reviewing them is to "... focus our attention on a critical survey of the main components of recent departures [from these theories]," rather than with the content of theories themselves.

Chapter 2 begins with a discussion of Parsons' well-known work on systems theory, but the bulk of the chapter is devoted to an analysis of Dunlop's *Industrial Relations Systems.* Poole describes Dunlop's book as a "seminal study" and contends that it brought about a "major shift" in the analysis of unionism — perhaps a paradigmatic shift in the Kuhnian sense of the term (see Kuhn, 1962). True to a critique, Poole assesses strengths and weaknesses of Dunlop's framework, but it is at this point that some of the author's more annoying tendencies become apparent. Specifically, Poole presents an equation derived from his review of Dunlop's work that models the web of rules as the dependent variable, and actors, technological, market, and power contexts, and system ideology as independent variables. Apart from the fact that these elements of Dunlop's framework are well known to industrial relations scholars, though less so to organizational behavior specialists, specifying them in equation form implies that the framework is, in fact, a theory from which testable hypotheses can be generated. Yet more than two decades of research since the publication of Dunlop's book have failed to establish that his framework of analysis is anything more than a statement about factors that are important to collective bargaining — a useful statement, to be sure, but hardly a theory. Poole seems unable to bring himself to state what his criticisms (and those of others that he reviews) imply, namely, that Dunlop's "seminal work" does not provide a theory of unionism or collective bargaining.

Chapters 3 and 4 deal with the "Oxford School" of industrial relations theory. In particular, Poole examines Flanders' work on collective bargaining, which emphasizes the role of internal political processes, so-called volitional factors, the economic environment, technology, and cultural values in shaping union objectives in bargaining. Here, Poole is more explicit in concluding that Flanders has provided "... a set of explanatory dimensions which ... have no special weights attached to designate their relative significance." Poole also analyzes the writings of Fox and Clegg which, somewhat in contrast to Flanders, go beyond the union's focus on job regulation to matters of power and structure in society. Here, the Oxford school is shown to be especially interested in the pluralistic dimensions of trade unionism, although this interest is rather cumbersomely described.

In Chapter 5, Poole considers the connection between social inequality and trade union behavior and attempts to demonstrate that the concept of power is central to modern trade union analysis. Based on a review of "Weberian and Marxian scholarship," Poole concludes that "there are major variations in basic values and perspectives of the world and . . . these are connected with the occupancy of structurally different social positions, on the one hand, and patterns of control in these classes, on the other." But the extent to which the "social stratification school" contributes to an understanding of union growth and behavior (that is, collective bargaining) is problematic, and this is apparent even from the work of Hyman — work reviewed by Poole — who otherwise attempted to construct a theory of trade unionism based on Marxian premises. To counteract employer power, some workers organize and seek a measure of job control, but only rarely does this occur among the underclass (or lowest class) of a society. Further, collective bargaining typically occurs between unionists and managers, not business owners, so that the image of a clash between widely disparate classes is, in the modern period, less salient than differences and disputes between interest groups. As to the matter of power in union affairs, this is muddled rather than clarified by Poole's analysis, despite the author's review of the works of Bain, Goldthorpe, Lockwood, Martin, and Prandy, among others. Power is variously treated here as an independent, intervening, and dependent variable. Further, while Poole cites Abell's work on the operationalization of the concept of power as job regulation and job control, which are measurable bargaining outcomes, he fails to acknowledge the accumulating body of American and Canadian evidence of bargaining outcomes that supports a view of power as a dependent variable in the study of unionism (e.g., Gerhart, 1976; Kochan and Block, 1977; Anderson, 1979). This chapter might also have been strengthened by a more specific treatment of economic analyses of unionism and bargaining power. The absence of any references to the work of Bendix (1956) and to the concept of authority is also rather curious in a sociological treatment of "modern trade union analysis."

Chapter 6 focuses on structuralist approaches to trade union behavior. Poole separates the structural components of analysis into primary (macro-) and secondary (micro-) categories. The first includes the politico-economic and technological structures as well as the division of labor, while the second encompasses occupational and community structures, the size of enterprise, and so-called micro-structural elements (for example, the type and behavior of the work group). From his review of research on these structural components, Poole observes that there are strong positive correlations between enterprise size and union membership, between public ownership and union density, and between the business cycle and union growth. However, Poole does not consider how the determinants of unionism (membership level or growth) would be affected if macro- and micro-level variables were combined in one study. It is not unreasonable to expect some treatment of such a key matter in a book that promises to develop a new, integrated theory of trade unionism. Further, Poole's discussion of criticisms of Bain and Elsheikh's work on British trade union growth fails properly to deal with the simultaneity of wages and unionism, an issue that has been empirically examined in American manufacturing industries and in the public sector (Ashenfelter and Johnson, 1972; Schmidt and Strauss, 1976; Bartel and Lewin, 1981). Variables such as technology and the division of labor are discussed by Poole not in terms of their correlations with unionism, but instead in terms of their impacts on the type, quality, and character of unionism. What strikes this reviewer most about these passages, and also about those that deal with the rise of corporatism and the role of the state, is the absence of references to the fundamental work of Smith (1937) on political economy and the division of labor and to modern studies of differences in union power in bargaining with employers in concentrated, as opposed to competitive, sectors (e.g., Dalton and Ford, 1977). The treatments of community and union structures in the closing pages of this chapter are brief indeed, but even they are more substantive than the cursory description of Walton and McKersie's important work on the behavioral dimensions of unionism and collective bargaining.

The concern of Chapter 7 is with "distinctively organizational theories of trade unionism." Here, Poole reviews various British and American studies of internal union governance, structure, and processes and is particularly concerned with the determinants of union democracy. From these studies, he concludes that the internal dynamics of unions are fundamentally affected by environmental factors (i.e., the degree of uncertainty), evolutionary factors (i.e., local union autonomy), and contextual factors (i.e., the political culture). This seems to imply that a well-developed, integrated model of union democracy has emerged from the literature. Yet in reviewing the work of Anderson, Poole notes that union democracy may be influenced by internal processes of the union, and he goes on to observe that "the fruitful integration of environmental and organizational perspectives . . . could be usefully developed in further research designs on union government." Poole himself offers no such integration or design, however, and he never asks what democracy means in the context of organizations that must exercise discipline and sometimes engage in militant action in bargaining with employers. From an application of Etzioni's classification of organizations to unions and from the work of Edelstein, Warner, Child, and Loveridge on union processes and functions, Poole derives the interesting proposition that there is a "tendency for occupational interest groups to be *more* centralized than business firms." Yet, Poole also observes that the models of union democracy that give rise to this conclusion have not related the government and internal structure of unions to membership heterogeneity and environment and that "the relative weights of the key variables which have been isolated to date" are not well understood. If this is so, then the contribution of "distinctively organizational theories" to the study of trade unionism remains in doubt.

The penultimate chapter of this book, titled "Culture, Values, and Perception," begins by examining the general methodological implications of the action approach to social behavior. In brief, this approach focuses on the *"means-and-end relationship of reasoning that gives the structure of action."* For Poole, this means, in turn, that "observable correlations constitute only a preliminary step in the analysis which requires subsequent development to be construed in a causal fashion." But does Poole go beyond the "preliminary step?" I think not. In the middle portion of this chapter, Poole observes that culture, civilization, and values "inform union purposes," and that a political party is an instrument by which social actors *"control the environment in which union action in the industrial context takes place."* These are causal statements to be sure, but they do not necessarily flow from the empirical studies and attendant correlations that Poole reviews in his book. And as to the four-fold categorization, based on Weber's work, of "subjective variables in so far as trade union action is concerned" that is proposed in the last section of Chapter 8 — instrumental action, value rational action, affectual action and traditional action — Poole may have contributed a useful typology to the study of trade unions, but empirical validation is required in order to reach a more informed judgment on this point.

The last (and unnumbered) chapter of *Theories of Trade Unionism,* titled "The Emerging Synthesis," identifies four "signposts" for future research: (1) the importance of attaching weights to the main determinants of union action, (2) the need to distinguish dependent as well as independent variables, (3) a preliminary outline of hypothesized relationships between independent and dependent variables, and (4) the role of knowledge in enhancing human subjectivity in all contexts, including trade unionism. Further, Poole identifies the key dependent variables that he believes should be "isolated for analytical purposes": (1) trade union growth, (2) trade union structure, (3) internal structure (administration and government), (4) perceptions of unions and unionism, (5) differential rates of participation in unions, (6) interaction relations within unions encompassing relations between rank-and-file members, representatives and leaders, and (7) relationships with employers and managers, the state, and the legislature. Still further, Poole proposes that certain of these variables, for example, union character and membership aspiration, are "the product of 'subjectivist' influence," while others, such as the relationships with employers and government, are "particularly affected by the balance of power." Moreover, it seems to be Poole's belief that increased knowledge about trade unionism, especially when based on "institutional and organizational" theories, can be used to bring about an improvement in the condition of organized workers and of society in general.

What is one to make of all this? On the positive side, this reviewer applauds the high-mindedness of Poole's work, the attempt to set unionism and collective bargaining in a larger social setting, the effort to bring the perspectives of organizational sociology to bear on industrial relations, and the substantial (if occasionally incomplete) list of references, especially to British works, that the author provides. Also of value are some of the graphical models of unionism and collective bargaining, which suggest that certain important independent variables affecting union behavior are common to North American and British research on this topic. On the negative side can be cited the excessive use of jargon, qualifiers, and complex, double-negative sentences; the discursive and eliptical discussions of various points throughout the book; the elementary specifications of equations concerning union behavior; the insufficient treatment of economic variables affecting unionism and of simultaneity in modeling union behavior; and occasional confusion about dependency relationships. But the principal weakness of this book lies in its failure to achieve the author's stated objective, namely, a new synthesis or integrated framework for the analysis of trade unionism. Such an objective is lofty indeed, and perhaps no author should be too seriously faulted for failing to achieve it. Nevertheless, when an otherwise high-minded, informed analysis concludes with a laundry list of variables and speculations about causal relationships, some of which have been subjected to rigorous research by contemporary scholars, one is left not only with a sense of confusion about the basic objective of the work in question, but with a sense of disappointment. In the opinion of this reviewer, new theories of labor and trade unionism are sorely needed, especially theories that derive from the behavioral sciences and that may help to forge stronger linkages between the field of organizational behavior and industrial relations. Unhappily, Poole's *Theories of Trade Unionism* does not move us much closer to these goals — although readers of this journal should examine the book and judge this matter for themselves.

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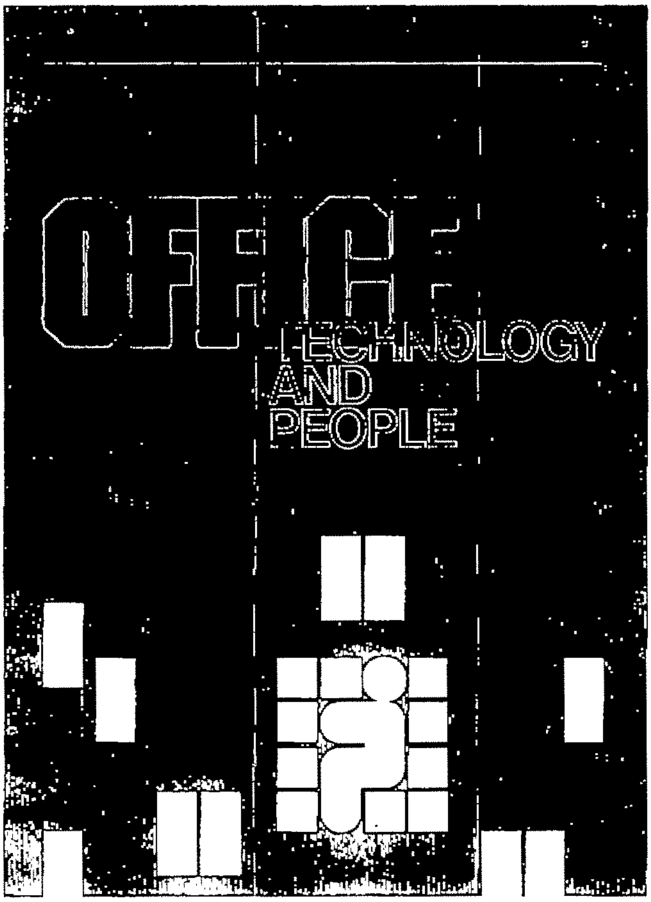

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